

acters. For the present, I should be inclined to leave it in a group by itself, placing it in a plan of genealogical descent expressed by the top of a tree (such as that so frequently used by M. Milne-Edwards and Professor Flower) in a circle not far removed from the great *Rusa* group of Asia, to which, notwithstanding the absence of horns, many of the cranial characters lead me to think *Hydropotes* most nearly allied.

April 16, 1872.

Dr. E. Hamilton, V.P., in the Chair.

A letter was read from Dr. R. Schomburgk, Director of the Botanic Garden, Adelaide, South Australia, C.M.Z.S., giving particulars of an instance in which a Monkey (*Macacus radiatus*) belonging to the zoological department of that Garden appeared to have exhibited reasoning powers.

The following papers were read:—

1. On the Mechanism of the Gizzard in Birds.

By A. H. GARROD, B.A., F.Z.S., Prosector to the Society.

[Received March 19, 1872.]

Notwithstanding the fact that the external form and general structure of the gizzard is known to almost every one, very little seems to have been made out as to the means by which this organ is enabled to crush and render available for nutrition the hard grains taken as food.

By most writers, the gizzard is supposed to act as a grinding-mill, moving from side to side, assisted in its work by sharp-pointed stones which its owner swallows for the purpose. This was evidently the opinion of Hunter, though he seemed scarcely satisfied on the point when he found that there was no perceptible lateral movement of the muscular masses during digestion.

Harvey gave a very good description of the action of the gizzard, as far as he knew it, in his description of the abdominal viscera of the common fowl ('On Generation,' Exercise vii.); and Hunter is the only physiologist who seems to have worked at the subject since that time.

The structure of the gizzard as a specialized organ is best seen in the Anserine birds; and that of the Goose will be now described.

Externally it is circular when looked at from in front, oval from the side, and fusiform from above or below. The œsophagus enters it as a large infundibuliform tube, with the broader end downwards

at its highest point; and the duodenum is continued out of it behind and above.

The organ may be shown to consist of two lateral masses of muscle, with an oblong cavity between them, which opens above and below into two sacs, with muscular walls of nearly uniform thickness.

The anterior superficial circular view presents the appearance of a central tendinous area, from which four lines radiate, nearly at right angles to one another, in an X-like manner. The upper and lower median areas between the corresponding limbs of the X are muscular and rounded at the margin, with the fibres directed to the central tendon. The lateral spaces are covered with glistening tendon, which at the edges shades into muscular fibres, not in this case curved, but straight and consequently squared off.

The superior and inferior median portions are parts of the walls of the corresponding cavities already mentioned; and the œsophagus enters the former at its inner angle, close to its junction with the right lateral mass; the duodenum being behind.

The lateral masses, with their tendinous coverings, are the muscular portions; and the cavity between them is just behind the central tendon.

The epithelial lining of the whole organ is very dense, and is continuous through the different cavities, terminating abruptly at the entrances to the œsophagus and the duodenum. Very shortly after the death of the bird it can be stripped off entire*. It is particularly dense where it covers the two lateral muscles, and generally forms a callous oval pad over each, which has to receive most of the force of the muscular walls as they act on the stones and food.

The central tendons, one in front and the other behind, are very strong; and so are the fibres which radiate outwards from them; they are almost entirely connected with the lateral muscles.

The lateral muscular masses have their fibres all tending forwards and backwards, each being inserted into both the front and back tendinous expansion, the central being nearly straight and the lateral ones being curved slightly outwards in the middle of their course.

The superior and inferior sacs are surrounded by muscular bands which bow over from front to back, being inserted into those parts of the margin of the central tendon to which they are opposite. By their contraction they reduce the size of the sacs and force any thing they contain between the lateral muscles, a considerable fold of the gizzard-lining, which acts as a kind of valve, preventing any stones entering the duodenum.

The action of the lateral muscles can be best understood by observing a horizontal section made through the middle of the gizzard.

The section is fusiform and exhibits a central oblong cavity, short from side to side, bounded before and behind by the central tendons, and laterally by the triangular muscular masses.

The accompanying figure and the above description show that in

* This coat is considered by recent German authorities to be a secretion from the deep glands, not an epithelium.

the gizzard there is no mechanism which could in any way produce any lateral movement of the one mass of muscles on the other; and it is difficult to conceive any epithelium, however horny and dense, that could resist the tearing-strain which would necessarily be associated with such movement, in addition to which, several gizzards that have passed through my hands have been so loaded with fat or adherent to the abdominal walls, that any lateral movement must have been impossible in them.

Fig. 1.

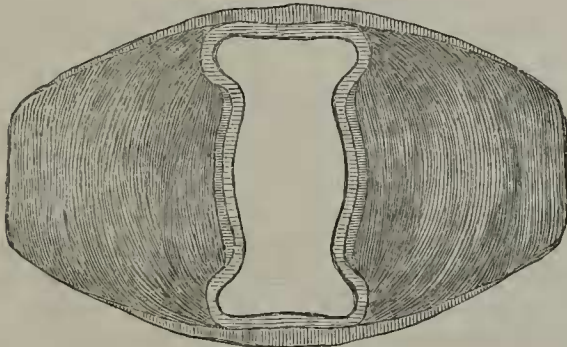


Fig. 2.

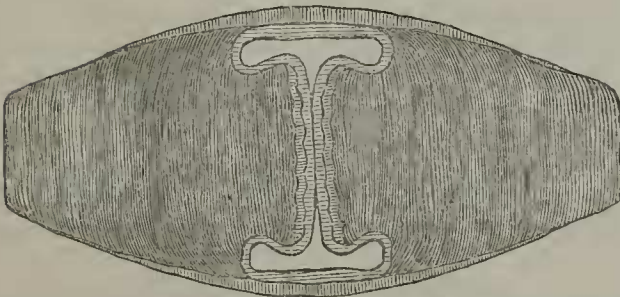


Fig. 1. Horizontal section of the gizzard in a state of relaxation.
2. The same in a fully contracted state.

The following explanation of the action of the gizzard as a simple crushing-organ seems to me much more in accordance with the known principles of animal mechanics.

As is well known, muscular tissue, when it contracts, does not alter in volume, but gains in breadth what it loses in length during its action. Consequently when a large mass of short muscular fibres contracts it must alter its shape considerably, increasing greatly in breadth.

This fact being borne in mind, the action of the gizzard is easily explained.

The two enormous lateral muscles, with their fibres tending forwards and backwards, when relaxed, have a large cavity between

them, into which the seeds and stones are thrust by the simultaneous contraction of the superior and inferior muscular bags. Directly these have become fully contracted, the lateral muscles act; and by approximating the anterior and posterior tendons they become greatly expanded laterally. But this expansion can take place in one direction only—namely, towards the gizzard-cavity; for the anterior and posterior tendons being situated obliquely with regard to one another, and the contraction taking place through the whole mass, expansion can only occur towards the base of the triangle. The motion in this direction is furthered by the arrangement of some of the muscular fibres, as can be seen on close inspection of the section of the relaxed gizzard; for the dense horny pads above referred to are cupped on their attached surfaces, and the fibres run from one margin of this cup to the other, in an arched manner, as seen in the section. Those fibres just above the cup are arched also in the same way, and the epithelial margins of the cup are more yielding than elsewhere. Consequently, when the contraction occurs, the fibres straightening reduce the antero-posterior diameter of the cup and make the pad more convex towards the intermediate cavity, and push each towards its fellow, this action, combined with that of the other more marginal fibres, producing a most powerful compression of the contents.

The great force exercised laterally by the contraction of a muscle can be well shown by tying a piece of tape round the middle of the arm proper, and then causing the biceps to contract forcibly, whereby the tape is broken.

As remarked by most writers on the subject, every intermediate condition of muscularity of stomach may be found in birds, from the simple non-tendinous one of the Raptores and others to the most muscular of the Anserine birds. The degree of muscularity depends on the nature of the food which the bird obtains, as shown by Hunter's experiment, in which he, by giving animal food to a Duck (I believe), caused a great diminution in the muscularity of its gizzard.

The state of the bird as to health also influences the development of the muscular fibres, the heart and gizzard being very similarly affected by impaired nutrition.

In the Gallinaceous and Passerine birds there is seldom a callous pad formed over the lateral muscles, the epithelium being generally plicated at right angles to the direction of the muscular fibres; and in them the organ seems to be a more simple squeezing-organ, though when rigor mortis occurs in a contracted gizzard it is seen that the muscular masses are convex on their opposed faces.

From these remarks and what has been previously observed on the subject, the following summary statement may be made:—

The gizzard is an organ which crushes, and so renders assimilable the harder portions of the food of birds. This food, having been previously macerated in the proventriculus or crop, is thrust between the lateral muscles (where it gets mixed with the small sharp stones it meets there) by the contraction of the superior and inferior

gizzard-sacs—upon which these lateral muscles contract simultaneously; and their arrangement is such that all the force of their contraction is converted into a compressing force at right angles to their direction. This force, by tending forcibly to obliterate their included cavity, comminutes the more yielding of their contents and squeezes from between them the resulting chyme, which finds no difficulty in entering the small orifice to the duodenum*.

2. On a supposed new Monkey from the Sunderbunds to the East of Calcutta. By JOHN ANDERSON, M.D.

[Received January 15, 1872.]

The natives of the district indicated in the title of this paper assert that two Monkeys occur in it, viz. the red-faced *Inuus rhesus* and another Monkey, which they state has no red about the face or on the hinder quarters. Acting on this information, I sent a collector to procure for me specimens of the two forms; and he returned with a number of undoubted examples of *I. rhesus*, and with two fresh skins which appear to me to be very different from any adult of *I. rhesus* that I have examined. The specimens in question were shot about 50 miles to the east of Calcutta; but as they only reached me as skins I can only give the measurements of these, and of the bones of the limbs and the characters of the skull. The longest skin measures from the snout to the root of the tail 22". The tail is $12\frac{1}{2}$ inches long; the front limb 16" 6''' and the hind limb 18" 9''' in length; the hand is 4" 6''' and the foot 6" 9''' long. The bones of the limbs measure as follows:—humerus 6" 3''', radius 5" 10''', ulna 6" 9''', femur 6" 10''', fibula $5\frac{1}{8}$ " 5''', and the tibia 6" 3'''. The fur is thick and rather woolly, and of a coarser texture than in *I. rhesus*, and presents no trace of annulation beyond the dark brown tips to the hair. As in that species, it is longest on the fore part of the body, especially on the interscapular region and shoulders and over the humerus. It is uniform brown above and on the front of the thighs, and pale on the outside of the limbs, but slightly darker on the back of the hands and feet. The under surface and inside of the limbs are of a dirty yellowish white; the tail is brown above, con-

* Since writing the above I find that there is a peculiarity in the gizzard-pads in the Swan and Goose, which causes a slight up and down movement of the lateral muscular masses when in action. The lower end of one pad and the upper end of the other are much more strongly developed and are thicker than the rest: this causes them to present a surface of contact one with the other, which is somewhat oblique with regard to the axis of the lateral muscles. Consequently, when these muscles come into play, the oblique surfaces tending to come into contact, the material to be crushed intervening, they, being opposed inclined planes, slide slightly on one another, the one mass rising while the other descends. During the diastole of the gizzard it resumes its former relations, and a reverse sliding occurs.

colourous with the back, and paler on the under surface. The hair on the top of the head is directed backwards. There is a superciliary band of black and dark brown hairs extending to the external orbital angle of the malar, where it meets with another similar band that reaches to the ear, or nearly so. The hairs of the latter band on one side in the skin form a tuft below and posterior to the external angle of the eye; and another occurs behind the fronto-malar suture. The hair on the side of the head behind the angle of the mouth is directed forwards, and is concolorous with the inside of the limbs. The ears are well clad; and there is a tuft of dark brown, almost blackish hairs at their upper margin. The maxillary region is sparsely covered with short hairs; and the margins of the lips are thinly clad with long black hairs.

As all my efforts to obtain a living example of this Monkey have proved fruitless, I am unable to say any thing regarding the colour of the skin of the face beyond what I have already stated on the testimony of natives. The callosities are more or less oval, and measure 1" 9''' in extreme length and 1" 1''' in their greatest breadth; all the parts about them, and the back of the thighs below them, are thickly clad with brown hair and not seminude as in *I. rhesus*. The thumb is well developed; and the fingers and toes, when stretched in the dried skin, do not exhibit the interdigital membrane extending beyond the middle of the first phalanx.

The distinguishing features of the skull, as compared with *I. rhesus*, are these:—It is larger than any skull of *I. rhesus* that has come under my observation, and is considerably more elongated, as is best seen when the two skulls are viewed from the under surface. In that position the facial portion is observed to be proportionally more strongly developed, larger and broader than in *I. rhesus*, and to equal nearly one half of the entire length of the skull, while in the latter species the facial portion is hardly perceptibly more than a third of the extreme dimensions of the skull. These proportions are founded on lines drawn vertically to the extremity of the præmaxilla and frontal, and another to the hinder margin of the skull. The greater size and more elongated character of the muzzle of the Sunderbunds Monkey is also well apparent in front and profile views of the skull. In the former aspect a striking feature is the broad and slightly concave preorbital surface, due to the outward convexity of the maxillæ produced by the enormously developed canines. In profile (see figs. 1 & 2, p. 531) the facial portion (maxillary region) is seen to be thrown more forwards than in *I. rhesus*, owing to the forward projection of the maxillary; and the infraorbital section of the malar is of great vertical extent, and directed outwards, forwards, and downwards; while in an adult skull of undoubted *I. rhesus* before me it is relatively much less expanded, and courses downwards and backwards. The infraorbital foramina are more remote from the margin of the orbit than in the last species. Another distinction between the two skulls is the much greater forward sweep and less curved character of the nasals in the Sunderbund Monkey, which also confers on the face a greater forward extension and expansion of the muzzle than in *I.*

Fig. 1.

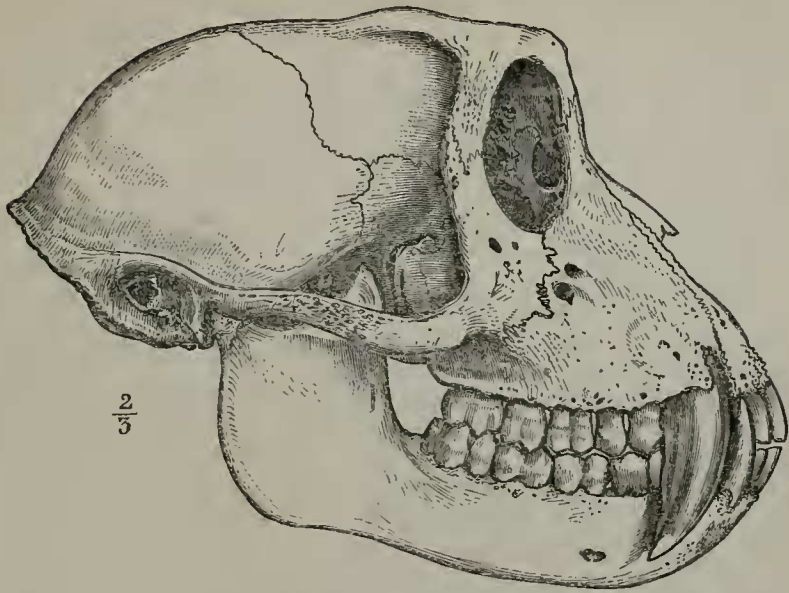
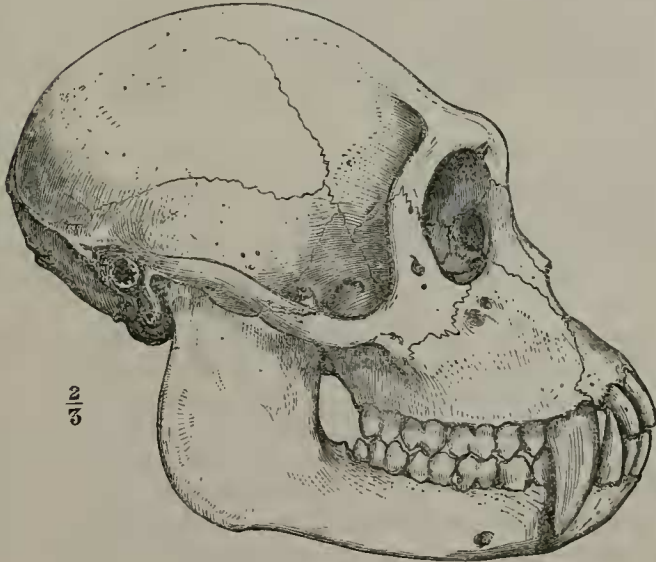
Skull of *Inuus* from the Sunderbunds.

Fig. 2.

Skull of *Inuus rhesus*, adult.

rhesus, in which the nasals are very short. In the former, also, the orbits look more upwards than in the latter, and they are rounded expansions quite as high as broad; while in the skull of

I. rhesus the superciliary ridge depends over them, and they are broader than high. In *I. rhesus* the palate partakes more or less of an elongated oval, whilst in the Sunderbunds Monkey it is much more oblong; in the latter it may also be pointed out that the posterior nares are narrower and more elongated than in the former, in which they are broader and more triangular than oval. The nasal orifice of the Sunderbunds skull is proportionally much more capacious than in *I. rhesus*, longer and directed more upwards. Its frontal shelves at once backwards and downwards from the superciliary margin, behind which there is a very faint convexity succeeded by a depression on either side of the frontal crest in the position of the same suture. The crest begins in the middle of the upper surface of the frontal, and is continued backwards as a sagittal crest. The temporal ridges proceed from the posterior sharp malar angle of the frontal, and abruptly arch inwards to join the anterior extremity of the median frontal ridge, defining a triangular surface, the base of which is formed by the superciliary margin of the frontal. In *I. rhesus* the frontal is well arched, and there is a considerable depression behind the superciliary crest, the temporal ridges not uniting in the median line, but being continued widely apart and passing directly backward parallel to each other as far as the lambdoidal suture. There is no frontal or sagittal ridge or crest in any adult *I. rhesus* I have examined. The parietal region in the Sunderbund Monkey wants the full rounded character that that area of the skull has in *I. rhesus*; and the occipital surface in the latter is much more convex than in the former, in which it is nearly quite flat, and directed much more downwards than backwards, while it looks backwards and only slightly downwards in *I. rhesus*. The mastoid region of the Sunderbunds skull is much more developed than in *I. rhesus*.

When the two skulls are viewed from the under surface, the most striking difference between them in that aspect is the contracted zygomatic arch of the Sunderbunds Monkey compared with the full and much arched zygomata of *I. rhesus*, which confers on the skull a shorter and more rounded character which does not belong to the former.

I have examined numerous living adult males of *I. rhesus*, but I never yet observed a specimen with the hair devoid of annulations; and in all, the thighs below the callosities were seminude,—characters which are the very opposite of those that prevail in the supposed new form. As I have not seen the living animal, and only know of it through two skins, I hesitate to do more than to state that it appears probable that two Monkeys occur in the Sunderbunds, and that they have hitherto been both included under *I. rhesus**.

The accompanying table contains the measurements of the skull

* The Monkey recently purchased of Mr. Jamrach, and named *I. rheso-similis* in my report (*antea*, p. 495), is, I have little doubt, a young example of the present species. Mr. Blyth suggests it may be the *Macacus assamensis*, M'Clell. (P. Z. S. 1839, p. 148), which is very probable.—P. L. S.

of *I. rhesus*, which, on the authority of Mr. Blyth, is that of an adult, and the corresponding dimensions of the skull of the Sunderbunds Monkey:—

Measurements of skull of I. rhesus (No. 1) and Monkey from the Sunderbunds (No. 2).*

	No. 1.		No. 2.	
	in.	lin.	in.	lin.
Extreme length of skull	4	7	5	3
Anterior margin of foramen magnum to anterior margin of premaxillary	3	2	3	7
Anterior margin of foramen magnum to palatal border (posterior)	1	4½	1	3½
Posterior border of palate to tip of intermaxillaries	1	10	2	4
Extreme breadth across zygomatic arches	3	6	3	4
Breadth over internal auditory foramen above root of zygomata	2	6	2	6
Breadth between temporal fossæ behind orbits, narrowest portion of skull	1	9½	1	9
Anterior margin of external auditory foramen to lower infraorbital foramen	2	1	2	4½
Lower infraorbital foramen to tip of premaxillary	1	5½	1	8
Posterior extremity of nasals to anterior extremity of premaxillaries	1	10	2	7
Length of external aperture of nostrils	0	9	1	1
Breadth of external aperture of nostrils	0	6	0	8
Breadth across malars (temporal curve)	2	8½	2	10½
Distance between anterior tips of maxillaries	0	11½	1	2
Breadth across orbits, internal margin	2	2	2	3½
Extreme height of orbits	0	10½	1	0
Greatest breadth of palate	0	11½	1	0
Length of posterior nares	0	6	0	7½
Length of alveolar surface of upper jaw	1	10	2	2½
Distance between canines internally at base	0	7½	0	10
Distance between last molars internally	0	10	0	9½
Depth from posterior border of palate to upper margin of superciliary ridge	1	9	2	2
Depth through anterior margin of foramen magnum	2	4	2	1
Condyle of lower jaw to tip of symphysis	3	9	3	9½
Condyle to coronoid process . . . . .	...	...	0	8½
Depth through coronoid process . . . . .	...	...	1	10
Depth through condyle . . . . .	...	...	1	6
Depth of jaw behind first premolar . . . . .	...	...	0	11½
Depth of jaw behind last molar . . . . .	...	...	0	10½
Breadth of ascending ramus . . . . .	...	...	1	3½

* Blyth states that this is the skull of a very large male; and as it is the largest in the Museum, I have selected it for comparison with the Sunderbunds skull, although it unfortunately wants the lower jaw.—J. A.

3. On the Birds of the Rio Negro of Patagonia. By W. H. HUDSON, C.M.Z.S. With Notes by P. L. SCLATER, M.A., Ph.D., F.R.S., Secretary to the Society.

[Received March 12, 1872.]

(Plate XXXI.)

I wrote a few days ago to inform Mr. Sclater that I had returned from Patagonia, and had determined to send to him all the specimens, or at least duplicates of all the species collected, as well as my notes on them. I now forward them; and as I cannot here learn the names of some of the species of which I am most anxious to speak, I have numbered these, so that it will be necessary to refer to the specimens themselves to ascertain their scientific names.

My observations have been confined to the valley of the Rio Negro and to the adjacent high grounds. I advanced altogether not much over a hundred miles from the sea.

I met with one hundred and twenty-six species of birds altogether on the Rio Negro; but of these, ninety-three are also found in the Buenos-Ayreal pampas. Most of the species common to Buenos Ayres and Patagonia are resident land birds in the latter locality. Seven or eight of them are summer visitors from the north, and as many more are Patagonian species that visit Buenos Ayres in winter. I therefore met with only thirty-three species peculiar to Patagonia; and as some of these are very rarely seen, I did not succeed in obtaining them all. This is certainly a very insignificant number; but in a country with an excessively dry climate, the water-courses few and widely separated, an arid sandy soil, and scanty, dwarfish vegetation, it is impossible that there should be many species of birds. Still, had I been enabled to advance one or two hundred miles further, I am confident that this collection would have exhibited a far greater variety, as the country becomes much more thickly wooded in the interior. I did not succeed in obtaining specimens of the *Avestruz petise* (*Rhea darwini*). It is called by the Indians "Molu Chinque," meaning "Dwarf Chinque," the name of the common species being Chinque. They are found over the whole country, from the Rio Negro to the Straits of Magellan, and are also met with, but rarely, north of the river. They were formerly exceedingly numerous along the Rio Negro; but a few years ago their feathers rose to an exorbitant price. Guachos and Indians found that hunting the Ostrich was their most lucrative employment; and consequently these noble birds were pursued unceasingly, and slaughtered in such numbers that they have been nearly exterminated wherever the nature of the country admits of their being chased. I was so anxious to obtain specimens of this bird that I engaged ten or twelve Indians, by offering a liberal reward, to hunt for me; they went out several times, but failed to capture a single adult bird.



Small lith.

M & N Henhart imp

CNIPOLEGUS HUDSONI ♂

A few facts I have been able to gather in reference to them may not prove uninteresting, as the *R. darwini* is but imperfectly known. When hunted it frequently attempts to elude the sight by suddenly squatting down amongst the bushes; and when lying close amid the grey-leaved bushes that cover the country it frequents, it very easily escapes the sight. When hotly pursued, it possesses the same remarkable habit as the *R. americana* of raising the wings alternately and holding them erect; it also manifests the same facility for suddenly doubling, in order to avoid its pursuers. It runs more swiftly than the common species, but is also more quickly exhausted. When running, the *R. americana* carries the neck erect or slightly sloping forward; the *R. darwini* carries it stretched forward almost horizontally, making it appear smaller than it is. From this habit it is said to derive the vernacular name of "Dwarf Ostrich." They go in flocks of from three or four to thirty or more individuals. I have not been able to learn if the males fight together as do those of the *R. americana*, or if they possess, like that species, a call-note. The strange trumpeting cry of the *R. americana* is often heard after they have been hunted and scattered in all directions; it is an indescribable sound, and resembles somewhat the hollow heavy sigh with which a bull often ends his bellowing, and appears to fill the air, so that it is impossible to tell from which quarter it proceeds. The soft leisurely whistling notes are the same in both species. The *R. darwini* begins to lay at the end of July—that is, a month sooner than the *R. americana*; in all the breeding-habits of the two species there is a wonderful similarity.

A number of females lay in one nest, the nest being merely a slight depression lined with a little dry rubbish; as many as fifty eggs are sometimes found in one nest. But the *R. darwini*, as well as the common species, lays many "huacho," or stray eggs, at a distance from the nest. I inspected a number of eggs brought in by a party of hunters, and was surprised at the great differences amongst them in size, form, and colour. The average size of the eggs was the same as those of the common species; in shape they were more or less oval or elliptical, scarcely two being found precisely alike. When newly laid, the eggs are of a deep rich green, and the shell possesses a fine polish. They very soon fade, however; and first the side exposed to the sun assumes a dull pale mottled green; this colour again changes to a yellowish, and again to a pale stone-blue, becoming at last almost white. The comparative age of each egg in the nest may be told by the colour of its shell.

When the females have finished laying, the male sits on and hatches the young. The young are hatched with the legs feathered to the toes; these feathers are not shed from the legs, but are gradually worn off as the bird grows old by continual friction against the stiff shrubs amid which they live. In adults usually a few scattered feathers remain, often only the worn-down stumps of feathers; but I have been told by hunters that the old birds are sometimes caught with the legs entirely feathered, and that these birds frequent plains where there was but little scrub.

The plumage of the young birds is of a dusky grey, without any white or black feathers or spots. When a year old they moult, and acquire the spotted plumage of the adults, but do not attain the full size till the third year.

1. The FALCON*.

This bird is met with in the thorny thickets on the high-terraced tablelands on either side of the Rio Negro. It is a solitary bird, and almost invariably found perched on the summit of one of the little bushes or trees; and amidst the uniform dull grey hue of the vegetation, its broad, pure white bosom renders it conspicuous at a great distance. It is a handsome bird, with an easy graceful flight, and when looking out for prey sails far higher than Hawks usually do. It preys much on the *Tuco-tuco* (*i. e.* *Ctenomys brasiliensis*), and seems to find abundance of food; for all the specimens I shot were exceedingly fat. It builds its nest in the centre of a large bush, and lays three white eggs.

While looking out for specimens of this Hawk I met with another species so remarkable in its structure and habits that I cannot refrain from giving a short notice of it, though, to my intense disappointment, I did not succeed in getting any specimens of it. It is apparently smaller than *Falco sparverius*; the upper plumage grey, the wings and under plumage white; the tail is long; the wings very blunt, and so short that when on the wing the bird rushes through the air with great violence. They are seen in pairs, sitting on the top of a bush, and at long intervals through the day suddenly burst into a loud excited chorus of notes, which resembles more the language of a Passerine bird than of a Hawk. Whenever I approached one, it would utter a loud, long cry of alarm, and go on repeating it till, before I was within shot, it would fly off, and take up its position on a distant tree. I saw about a dozen individuals, and followed them about several days, but in vain.

There is in the woods, on the margin of the Plata, a diminutive Hawk very rarely seen, and called by the natives *Rey de los Pajaros*, closely allied in size and form to the Patagonian bird, but differing in colour and possessing a far easier flight.

There are four Eagles found on the Rio Negro, but all doubtless well known. I send you two Owls†; the Burrowing Owl is also found along the Rio Negro. There are two Vultures, the Black and the Red-headed Vulture. The Condor is also met with occasionally

* The diurnal Accipitres of which specimens are sent by Mr. Hudson are of nine species, namely:—

- | | |
|--|---|
| 1. <i>Cathartes atratus</i> (Bartr.). | 6. <i>Harpyhaliaëtus coronatus</i> (Vieill.). |
| 2. <i>Polyborus tharus</i> (Mol.). | 7. <i>Geranoaëtus melanoleucus</i> (Vieill.). |
| 3. <i>Milvago chimango</i> (Vieill.). | 8. <i>Buteo erythronotus</i> (King). |
| 4. <i>Hypotriorchis femoralis</i> (Temm.). | 9. <i>Circus cinereus</i> (Vieill.). |
| 5. <i>Tinnunculus sparverius</i> (Linn.). | |

Unfortunately none of these are numbered 1; so that I am not able to say to which, if any, of these species Mr. Hudson refers as "The Falcon."—P. L. S.

† *Bubo virginianus* (Gm.) and *Glaucidium nanum*.—P. L. S.

on the Atlantic coast; I saw but one individual, and was surprised to find him proof against several charges of shot.

2. CHINGOLO GRANDE*.

This bird is the only representative of the Tanagers I have met with here, and differs from its gaudy congeners of the tropics in its plainer dress alone. Side by side with them it would truly be a sober bird; but seen amidst the dull-plumaged tribes that people the grey thickets of Patagonia, the rufous throat and bosom of the male give it almost a gay appearance. In its habits it very closely resembles the *Tanagra striata*: like that bird it builds a round and shallow nest in a close bush, and lays four eggs. It goes singly or in small flocks, sits on the top of a bush, and hides when approached, feeds on fruit and seeds; the flight is a series of sudden, short undulations, the wings producing a loud humming sound. The notes of the male are remarkable, and resemble, when the bird sings or utters its alarm on the nest being approached, the feeble bleating of a kid or lamb. This peculiar intonation is also possessed by the *Tanagra striata* in its song. This bird is quite common in the thickets bordering on the river.

3. [PHRYGILUS FRUTICETI, Kittl. ; Scl. Cat. A. B. p. 111.—P. L. S.]

This is a pretty and elegant bird, though possessing no bright colours; they go in pairs in the warm season, but in the winter unite in flocks often of two or three hundred individuals, and have a graceful undulating flight. On being approached they utter a series of low ticking notes, and occasionally a long squealing cry. The male has also a very agreeable song, which continues all the year. In pleasant weather the song is heard at all hours, on cold and cloudy days only at sunset. The bird usually soars from his perch, and utters his song while gliding down with wings depressed and tail outspread. When I first heard it, I was startled with its wonderful resemblance to the song of the Correndera Pipit (*Anthus correndera*); it is, however, much shorter and more powerful. This species is quite common in the thickets along the Rio Negro, in the neighbourhood of Carmen, but following up the river appears to become much rarer.

4. [DIUCA MINOR, Bp. Consp. i. p. 476.—P. L. S.]

This pretty little bird is exceedingly lively in its motions, social and quarrelsome in habits, and in winter often goes in flocks of several hundred individuals. The flock is usually widely scattered when on the ground and bushes; and when flying the birds incessantly pursue each other through the air, uttering all the time a soft chirp. The song of the male is the sweetest I have heard in Patagonia, with two exceptions—that of the *Cardinal amarillo* (*Gubernatrix cristatella*) and of the *Calandria blanca* (*Mimus triurus*), one who knows by heart “the songs of all the winged

* *Phytotoma rutila*, Vieill.—P. L. S.

choristers." In summer, when these Finches live in pairs thinly scattered over the country, the song of the male is the first indication of the approach of day. When the profound stillness of midnight yet reigns and the thick darkness that precedes the dawn envelopes earth, suddenly the noise of this little bird is heard wonderfully sweet and clear. In this quiet hour the song may be heard at a great distance, and is composed of half a dozen notes, repeated at short intervals till the day has fully dawned. But in winter, when they live in companies, their great singing-time is in the evening, when the flock has gathered in some large thick-foliaged bush, which they have chosen for a winter roosting-place. This winter-evening song is very different from that heard in summer, the notes appearing sharper, and uttered in a wild and rapid manner. A little after sunset they burst into a concert, which lasts several minutes, sinking and growing louder by turns, and in which it is quite impossible to distinguish the song of any individual. After a few minutes of silence, the singing is suddenly renewed, and again almost as suddenly ended. For an hour after sunset this fitful and impetuous singing is continued. Close by a house I lived in several months were three large *chañar* bushes, where a multitude of these Finches roosted every night; and they never missed singing a night, however cloudy, or cold, or rainy the weather was. So fond did they seem of this charming habit, that when I would approach the bushes, or stand beneath them, the alarm caused by my presence would interrupt the performance but a few moments; for suddenly they would burst almost simultaneously into singing, the birds all the time pursuing each other through the bushes often within a foot of my head.

The last three species I have described are the only hard-billed birds I found in Patagonia with which I was not before acquainted.

5. [MIMUS PATACHONICUS, Lafr. et D'Orb.—P. L. S.]

The Patagonian Calandria closely resembles the Buenos-Ayorean *Mimus calandria*, but is smaller, the plumage deeper grey, the eye is also a darker green. It is a very common bird, lives in pairs, and feeds on insects and berries. In its nidification it is like the *M. calandria*, the nest being composed of thorns and sticks, and lined with soft dry grass and cow-hair, and placed in the centre of a thorny bush; the eggs oval, four in number, and very thickly covered with flesh-coloured spots. When a person approaches the nest, the parent birds manifest their anxiety by perching and hopping on the twigs within a yard or two of his head, but without uttering any sound; the *M. calandria*, when alarmed, utters incessantly a loud harsh angry cry. Neither of these species will live in confinement.

The vocal performance of the Patagonian bird is characterized by the same apparently infinite variety as is that of the Buenos-Ayorean bird. It would scarcely be possible for me to give an adequate idea of its powers in a description; but I have among my notes some account of the song of *M. calandria*, which I will send at

some future time, and for the present satisfy myself by mentioning a few points in which the bird I am describing differs from the *M. calandria*. The singing of the Patagonian species is perhaps inferior, his voice being less powerful than that of the other species; his mellow or clear notes are often mingled with thrill ones resembling the songs or cries of various tenuirostral birds. While incapable of notes so loud or harsh as those of the Buenos-Ayres bird, or of changes so wild and sudden, he possesses even a greater variety of sweet notes: day after day, for months, I heard them singing, and I never once listened to them for any length of time without hearing some note or notes that I had never heard before. I have often observed that when a bird, while singing, emits a few of these *new* notes, he seems surprised and delighted with them; for after a silent pause he repeats them again and again a vast number of times, as if to impress them on his memory. When he once more resumes his varied singing, for hours, and sometimes for days, the expression he has discovered is still a favourite, and recurs with the greatest frequency. Many individuals seem to possess a peculiar style of singing; and they seem more or less able to borrow or imitate each other's notes: sometimes all the birds frequenting a thicket will be heard constantly repeating, for many days, a few particular notes as if they possessed no other song, while in other localities these notes will not be heard at all. The bird sits on the summit of a bush when singing; and its music is heard in all seasons, and in all weathers, from dawn till after dark; but he usually sings in a leisurely unexcited manner, remaining silent a long interval after every five or six or dozen notes, and apparently listening to his brother performers. These snatches of melody often seem like a prelude or promise of something better coming; there is in them such exquisite sweetness, such variety, that the hearer is ever expecting a fuller measure; and still the bird opens its bill to delight and disappoint him, as if not yet ready to begin.

6. [MIMUS TRIURUS, Vieill.; ScL. Cat. A. B. p. 9.—P. L. S.*]

I send you one specimen of the beautiful *Calandria blanca*. I do not know if any examples of this bird have ever been examined by naturalists. It is by no means numerous in Patagonia; certainly nothing was known of its song; but the pleasure I felt on making the discovery of its vocal powers it would be idle for me to attempt to portray. I noticed in the woods of *chañar*, along the Rio Negro, a few individuals of this species in the month of February; they did not sing then, but sometimes uttered a harsh note like that of the *Mimus calandria*. Had it not been for this note I should have thought the bird to be (seeing it only at a distance) a species of *Tamoptera*, from its black and white plumage, wild disposition, its

* I cannot distinguish the single specimen of this bird sent by Mr. Hudson from *Mimus triurus*, met with by Azara in Paraguay, by Bridges near Mendoza, and by D'Orbigny in Chiquitos, Bolivia. It is rather larger than my skin (collected by Bridges), and the black on the wings and tail is deeper; but I cannot regard it as distinct.—P. L. S.

rapid, high, and graceful flight. It disappeared in March without my having obtained specimens or heard it sing; for the native residents in Patagonia, many of whom were well acquainted with the bird, had told me that it was a very fine singer. In October, a few days before leaving the Rio Negro, I was one morning walking through the thick woods of *chañar*, when my attention was suddenly arrested by the song of a bird issuing from a bush close by, a song to which I listened with astonishment and delight, so totally different, so vastly superior to the songs of all other birds, whether native or foreign, to which I had ever listened. Notes surpassing in melody, power, and variety those of both the Patagonian and Buenos-Ayorean *Mimi* were rapidly poured forth in an unbroken stream, till I marvelled that the throat of any bird could sustain so powerful a song for so long a time. No sooner had this flow of unfamiliar music ceased, than I heard issuing from the same spot, the shrill, confused, and impetuous song of a small Patagonian Flycatcher, the No. 11*; this was succeeded by the delightful matin song of the small Grey Finch, No. 4†.

After this I heard the trilling song of the Red Bird (*Pyrocephalus rubineus*), with its silvery bell-like sound; then followed the leisurely uttered, mellow, delicious strain of the Yellow Cardinal (*Gubernatrix cristatella*). These songs followed rapidly (for no sooner did one end than the other began), and were all repeated with miraculous fidelity. At first I imagined that all these birds that had been imitated had actually been singing near me; but when the sweet vocalist resumed his own matchless song again, and I discovered that all the strains that I had heard had issued from a single throat, how much was my wonder and admiration for the delightful performer increased! I soon advanced near enough to catch sight of the singer, and found it to be the *Calandria blanca*. I found the pleasure of listening to him enhanced if he was at the same time seen: so carried away with rapture at his own melody seems the bird, so many and so beautiful are the gestures and motions with which he accompanies the performance. He would incessantly pass from bush to bush, sometimes soar above the thicket for a hundred yards, with a flight as slow as that of a Heron, and at times rise with a swift, wild flight, then slowly circle down and sit on the summit of a bush, with the broad wings and tail spread out, an object beautiful to see. What a pity it is that this bird should frequent only a desert country, where so very few can hear it. I cannot help saying that I consider it the finest singer in America, though such an opinion may be thought extravagant; but it possesses to perfection the marvellous faculty of imitation, that has given such celebrity to the Virginian Mocking-bird, and I cannot believe that the Mocking-bird of the North, in its own song, can surpass or even equal the *Calandria blanca*. This bird disappears from the vicinity of the Carmen at the end of summer; but it probably does not go very far, as it by no means belongs to a

* *Stigmatura flavocinerea* (Burm.).—P. L. S.

† *Diuca minor*, Bp.—P. L. S.

migratory family: probably it passes the winter on those great plains covered with forest west of Bahia Blanca. The bird is called *Calandria blanca* in Patagonia; but the same name is also given, and more appropriately, to another species, which I have not seen; but as the descriptions of seven or eight different persons, who have observed it, and spoken to me about it, all agree, I have no doubt of its existence. It is found, they say, in the thickets near the Rio Colorado, is like the common *Calandria* in shape and size, but its plumage is entirely of a snowy white. All the Guanchos whom I have heard speak of it say precisely the same thing, that it is a most beautiful bird, a fine singer, and is invariably to be seen in one particular little wood through which the road from Bahia Blanca to Patagonia runs.

7. [*MUSCISAXICOLA MENTALIS* (Lafr. et D'Orb.), *Scl. Cat. A. B.* p. 205.—P. L. S.]

This little dark grey bird I first saw in the month of June, and I afterwards met with several small flocks of them. I am disposed to think, from my never having seen one till the depth of winter, that they migrate towards the north from the extreme southern portion of the continent in the cold season. In its habits, so far as I observed them, as well as in conformation, it closely resembles many other species of *Tænioptera*: it has a rapid, easy flight, goes in small flocks, is fond of alighting on smooth barren spots of earth, over which the individuals of the flock immediately scatter, running about like Plovers in all directions with great rapidity; it also occasionally assumes the habit of the true Flycatcher, darting from its position on a dry stalk or spray to catch an insect on the wing. It is a shy bird, and has no song but the low plaintive note common to all the birds of its genus.

8. [*TÆNIOPTERA RUBETRA*, Burm.; *La Plata-Reise*, ii. p. 461.—P. L. S.]

I saw this pretty brown and white *Tænioptera* in summer and autumn; but it is not a common bird. They go in small scattered flocks, and frequent level plains abounding in low bushes. In notes, flight, and manner of feeding they resemble most of the other species of *Tænioptera*, but are not so wild or active as the last.

9. [*TÆNIOPTERA MURINA*, Lafr. et D'Orb.—P. L. S.*]

This species, like the preceding, lives singly or in pairs; in winter it leaves the Rio Negro, but reappears there early in the spring.

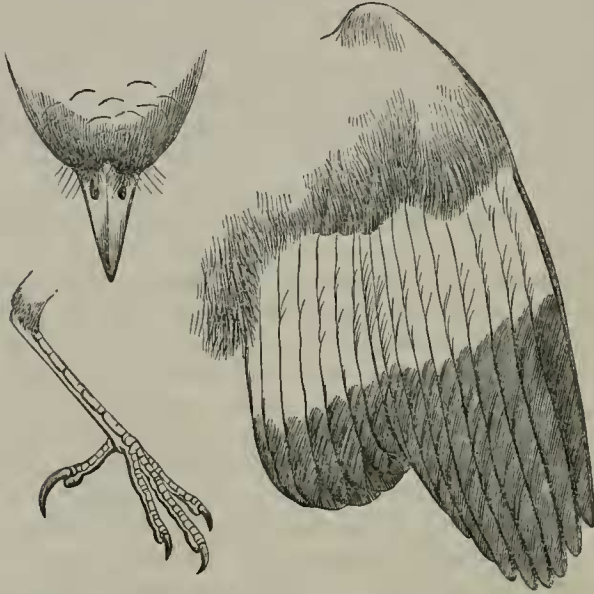
10. [*CNIPOLEGUS HUDSONI*, sp. nov. (Plate XXXI.)

Niger unicolor: remigum pogoniis internis pro dimidio basali et maculis plumarum hypochondrialium albis: rostro obscure plumbeo, pedibus nigerrimis: remigibus tribus externis valde angustatis, acutis: long. tota 6, alæ 2·8, caudæ 2·6, tarsi 0 8.

Hab. Rio Negro of Patagonia (*Hudson*).

* *Pepoaza murina*, D'Orb. *Voy.* p. 348.

This new species is of about the same size as *C. cyaneirostris*, but has a large portion of the bases of the remiges on their inner web white, as in *C. aterrimus*. From *C. aterrimus*, however, it is readily distinguishable by its smaller size, by the peculiar narrowed remiges, and by the white spotting of the flank-feathers. This last character is not found in any other species of the genus.



Bill, foot, and under surface of left wing of *Cnipolegus hudsoni*.

Mr. Hudson sends four male specimens of this new species, which I propose to name after its energetic discoverer. It would be very interesting to get the female also.—P. L. S.]

This bird makes his appearance late in September in the close thickets bordering on the Rio Negro; he is usually seen perched on the topmost twig of a bush watching for insects, after which he darts with great swiftness. He has one most remarkable habit: suddenly quitting his perch he glides two or three times close round it, uttering at the same time a peculiar sharp note. It also frequently utters a sharp, rapid chirping, but has no song. It is a very lively little bird; and when, flying, it displays the white bars on its wings it has a strange and pretty appearance.

11. SERPOPIAGA, sp.*

This little bird does not migrate, lives in pairs, and frequents bushes, where it is never seen at rest, but hops incessantly from twig

* This is the *Phylloscartes flavocinereus* of Burmeister, La-Plata Reise, ii. p. 455. Mr. Hudson's skins agree with my specimen from Mendoza (Weisshaupt). It is, however, most nearly allied to *Stigmatura budytoides* (Lafr. et D'Orb.), Scl. et Salv. P. Z. S. 1866, p. 188; and I propose to place it in the same genus, as *Stigmatura flavocinerea*.—P. L. S.

to twig in a leisurely delicate manner, the male and female all the time uttering a variety of low notes, as if conversing together. They have also a shrill, impetuous song, uttered by the two birds in concert.

12. SERPOPHAGA*.

There is a considerable difference between the appearance of this bird and the last; he is, perhaps, the least of this tribe, and carries a distinguishing badge in the long curling crest that adorns his head. But in all his habits he closely resembles the other bird. Indeed, with one exception, all the species belonging to this group with which I am acquainted, so closely resemble each other in habits that a description of one will very nearly apply to the others. They are residents all the year in the places they frequent, live in pairs, answer each other in low chirping notes, have also long notes, like squealing of mice, sing in concert, never rest from their easy, calm motions, and build beautiful deep little nests. The one exception I mentioned is *S. nigricans*, a bird differing in many of his habits from the others.

13. THE GALLITO †.

Is very well known to the residents on the Rio Negro, and derives its vernacular name of *little cock* from the manner of carrying the tail elevated like the domestic fowl.

I found it exceedingly numerous in the thickets near to the town of Carmen; but following up the river it becomes scarcer. It is in its habits an amusing bird, scarcely possessing the power of flight, but so ready to take alarm, swift of foot, and fond of concealment, that it is often very difficult to get a sight of it. No sooner do they spy out an intruder in the thicket, than the alarm is spread, each bird hopping up into a bush, and uttering incessantly, at intervals of three or four seconds, a loud, hollow chirrup, and at times a violent scolding cry, several times repeated. If the bird finds himself approached, he immediately springs to the ground and runs off with amazing rapidity to a safe distance. Then he again ascends a bush and resumes the angry note. Three or four times I have seen one raise itself from the ground, and fly several yards with a low feeble flight; but whenever I chanced to come on one in an open place I found that I could overtake it running, without the bird being able to raise itself. They often fly down from a bush, but always ascend it by hopping from branch to branch.

The nest is built in the centre of a bush, from four to six feet above the ground; it is domed, has a small entrance, and is constructed entirely of a dry hair-like grass. They lay four white eggs.

14. [SYNALLAXIS SORDIDA, Less.; ScL. Cat. A. B. p. 153.—P. L. S.]

This little bird is very common in the woods of Patagonia, goes

* *Aneretes parulus* (Kittl.), ScL. Cat. A. B. p. 212.—P. L. S.

† *Rhinoerypta lanceolata* (Geoff.), Burm. La-Plata Reise, ii. p. 471.—P. L. S.

in pairs, and builds a large nest of sticks with a narrow long entrance, and lays four pointed white eggs; but there is as little in its habits or language, as in its form or colour, to distinguish it from many other members of the extremely monotonous tribe to which it belongs.

15. [SYNALLAXIS PATAGONICA, D'Orb. Voy. p. 249.—P. L. S.]

This bird resembles the last in colour and size, but is distinguished by its short tail, which it carries elevated like the Wren. It hops with great rapidity over the bare ground, and feeds much about the roots of dwarf bushes*.

16. [SYNALLAXIS SULPHURIFERA, Burm. P. Z. S. 1868, p. 636.—P. L. S.]

I send you two, unfortunately much injured, specimens of this bird, which appears to me identical with Burmeister's *S. sulphurifera*. It must be exceedingly rare in Patagonia; for this pair were the only ones I saw during my sojourn in that country, though I constantly sought for them in the most likely places. You will observe that its affinities are with the *Limnornis curvirostris*; in note and habits it also closely resembles that bird.

The male and female keep together, and glean for insects about the roots of reeds and giant grasses, and when approached run to their tops, uttering shrill, angry notes.

17. SYNALLAXIS STRIATICEPS, Lafr. et D'Orb.

This species is rare in Patagonia, and seems to be identical with the northern species.

18. SYNALLAXIS ÆGITHALOIDES, Kittl.

Perhaps if you compare this species, of which I send several examples, with specimens from the Plata, you will detect some difference†. The Patagonian bird differs considerably in language and habits from the Buenos-Ayorean bird; the latter is solitary, the former gregarious, often being seen in loose flocks of forty or fifty individuals.

19. [UPUCERTHIA DUMETORIA, Geoffr. et D'Orb.—P. L. S.]

This bird is exceedingly common wherever I have been in Patagonia; I mentioned in a former letter having obtained a pair of them in Buenos Ayres.

* Mr. Hudson likewise sends two specimens of "another species of *Synallaxis* with short tail, which closely resembles, in habits as well as structure, the species No. 15," *i. e.* *S. patagonica*. These birds are referable to *S. modesta*, Eyton, *Sci. Cat. A. B.* p. 153. Mr. Hudson shot them "in the valley of the river, 60 miles distant from the locality in which the other species was obtained."—P. L. S.

† I have compared Mr. Hudson's skins with specimens from La Plata and from Chili, but can see no differences worth dwelling upon. But see D'Orbigny's remarks, *Voy. Ois.* p. 243.—P. L. S.

20. [HOMORUS GUTTURALIS (Lafr. et D'Orb.).—P. L. S.]

This homely and interesting bird is, perhaps, a new species; it resembles the *Homorus unirufus* of the northern states of La Plata; but it is of a paler brown, and the eye is dark instead of white as in that species. It frequents open plains abounding in low, thorny, and widely scattered bushes, and on the approach of a traveller shows itself on the summit of a bush, with crest erect, and uttering a succession of sharp, angry chirps; it also has, when much alarmed, a shrill, trilling scream like that of the *H. unirufus*. They are seen in pairs or in families of five or six individuals at intervals during the day; the male and female perform a chorus of notes so powerful that they may be heard distinctly a mile away. Its flight is low and feeble; but it runs very rapidly on the ground, and subsists principally on insects extracted from the earth, and decayed bark about the roots of trees and shrubs. This bird builds a nest extraordinary for its size and strength; it is placed in the middle of a low, thorny, and widely spreading bush; it is perfectly round, the lower part just raised only a few inches above the ground; the depth of the whole nest is usually from 4 to 5 feet, the cavity inside is 1 foot in depth. The opening is on the side and small, and has in front of it a narrow arched gallery resting on the horizontal twigs, and 13 or 14 inches in length. The nest is composed entirely of thick sticks, and is so compactly built that I had hard work to demolish one by thrusting the barrel of a long musket into it and prizing it up by pieces. I also, to test the strength of a nest, stood on one for some time, stamping my heel on it with great force, without injuring it in the least.

21. [COLUMBA MACULOSA, Temm.—P. L. S.]

This bird appears in winter in the settled parts of the Rio Negro; they come in large flocks, and gather in great numbers on the ploughed fields, eager to devour the wheat; so that the farmers, when sowing broadcast, have to be constantly firing at them, or to keep trained dogs to chase them from the fields. When on the ground, the flock keeps very much crowded together, all the birds running about with great rapidity, and eagerly snatching up the grain or seed they find. The lively, brisk manner of a Patagonian Pigeon is in strong contrast with the slow, stately steps and deliberate manner of picking up its food of the Buenos-Ayreal species*. Its song is composed of notes equal in length and number to that of the Buenos-Ayreal bird; but the voice of the former is exceedingly hoarse, while that of the latter is the most agreeable dove-melody I have ever heard. They retire on the approach of summer, and probably breed in the vast forests of Western Patagonia.

22. [EUDROMIA ELEGANS, D'Orb. et Geoffr.—P. L. S.]

I send several specimens of the *Martineta*, a handsome and interesting bird. It is found in the north-western portion of

* *i. e.* *Columba picazuro*: v. ScL. et Salv. P. Z. S. 1868, p. 143.—P. L. S.

the Plata States, and again we met with it south of the Rio Colorado, and in the vicinity of the Rio Negro it is abundant; ours were on the high bushy grounds. But before speaking further of this species I will give a rapid sketch of its congener of the Pampas, the *Perdiz grande**.

This bird is common on the Buenos-Ayorean plains, wherever the long grasses abound. I do not know how far north it extends; but south it is common as far as the Colorado. South of this river it becomes very rare, and disappears before the Rio Negro is reached. This bird has no cover but the giant grasses, through which it pushes like a Rail; and wherever the country is settled it soon disappears, so that it is now extinct over a vast portion of this province.

It is solitary in its habits, conceals itself in the grass very closely, and flies with great reluctance. I doubt if there is anywhere a bird with such a sounding flight as this; and I can only compare the whirr of its wings to the rattling of a light vehicle driven at great speed over a hard road. From the moment it rises till it again alights there is no cessation in the rapid vibration of the wings; but like a ball thrown by the hand the bird goes gradually sloping towards the earth, the distance it is able to accomplish at a flight being from 1500 to 2000 yards. This flight it can repeat when driven up again as many as three times, after which the bird can rise no more. The call of the *Perdiz grande* is heard at all seasons of the year; on pleasant days, and invariably near sunset, it is uttered while the bird sits concealed in the grass, many birds answering each other; for though I call the *Perdiz grande* a solitary bird (they rarely being seen in company), several individuals are mostly found living near each other. The song or call is composed of five or six long notes, with a mellow, flute-like sound, and so impressively uttered and sweetly modulated that it is, perhaps, the sweetest bird-music heard in the Pampas.

The *Perdiz grande* lays five large and almost round eggs, of a dark wine-purple colour.

The *Martineta*, from its size and mottled plumage, somewhat resembles the *Perdiz grande*, the most apparent exterior difference being the redder plumage and longer bill of the latter, and the long, slender crest of the former, which, when excited, the bird carries direct forward, like a horn. There is, however, an anatomical difference between the species of far more consequence. The structure of the intestinal canal in the *Martineta* is most extraordinary, and totally unlike that of any other bird I have ever dissected; the canal divides near the stomach into a pair of great ducts that extend almost the entire length of the abdominal cavity, and are thickly set with rows of large membranous clam-shaped protuberances.

The *Martineta* frequents the elevated tablelands, and are found where patches of scattered dwarf scrub occur among the close thickets, and subsist on seeds and berries. They are extremely fond of dusting themselves, and form circular nest-like hollows in the ground for that purpose; these hollows are deep and neatly made,

* *Rhynchotus rufescens*, Temm.—P. L. S.

and are visited by the birds every day. They go in coveys of from half a dozen to twenty individuals, and when disturbed do not usually take to flight, but start up one after another, and run off with amazing swiftness, uttering as they run shrill, squealing cries, as if in great terror. Their flight, though violent, is not so sounding as that of the *Perdiz grande*, and differs remarkably in another respect: every 20 or 30 yards the wings cease their vibration, remaining motionless for a second, when the bird renews the effort. The flight is accompanied with a soft wailing note that appears to die away, and again swell as the flapping of the wings is renewed. Thus the flight is a series of rushes, rather than a continuous rush like that of the *Perdiz grande*. The call of this species is never heard in winter; but in the month of September they begin to utter in the evening a plaintive, slightly modulated whistle; as spring advances the coveys break up, and their call is heard on every hand, and often all day long from dawn till after dark. The call varies greatly in different individuals, from a single whistle into a song of five or six notes, resembling that of the *Perdiz grande*, but inferior in compass and sweetness. They begin to breed in October, and lay in the middle of a small, isolated shrub: the eggs are from twelve to sixteen; but the former number is not common; they are a trifle smaller than those of the common Quail, possess a fine polish, and are deep beautiful green in colour.

23. [PERDIZ CHICHO*.]

You will, perhaps, have doubt about this bird being a new species; so great is its resemblance to the *Perdiz comun* [*i. e.* *Nothura maculosa* (Temm.) P. L. S.], the Lesser Partridge, common everywhere on the Pampas. After arriving in Patagonia, I was told by several persons residing there that there were two species of small Partridge: one I found to be the *Perdiz comun* of Buenos Ayres, which frequents only the valley of the Rio Negro; the other was the smaller species, of which I send you several examples, and found only on the high tablelands. The adults of the last species resemble the young of the former; and after having observed them for several months, I am satisfied that they are not identical, nor varieties; for they differ not only in size and colouring, but in habits.

I would far sooner consider the *Progne chalybea* and *P. purpurea*, identical in size, language, and habits as these birds are, one species, than *Perdiz chico* and *Perdiz comun*. I will first speak of the *Perdiz comun*. This bird, so abundant everywhere on the Pampas, closely resembles, in all its habits, the *Perdiz grande*, living entirely amongst grass, as the Rail does amongst reeds: they are seen singly; but a number of individuals are usually seen in proximity. They are tame in disposition, and move in a leisurely manner, uttering as they walk or run a succession of soft whistling notes. When numerous

* I have compared Mr. Hudson's specimens with the typical example of *Nothura darwini*, G. R. Gray, List of Gallinæ, p. 104, and believe them to be identical. The type of *N. darwini* is from Bahia Blanca, and is spoken of by Darwin (Voy. Beagle, Birds, p. 119) as *N. minor*.—P. L. S.

it is unnecessary to shoot them, as any number can be killed with a long whip or stick. This species has two distinct songs or calls, pleasing to the ear, and heard all the year round: one is a succession of twenty or thirty short, impressive notes of great compass, and ended by half a dozen rapidly uttered notes, beginning loud, and sinking lower till they cease; the other call is a soft continuous trill, appearing to swell mysteriously on the air; for the hearer cannot tell whence it proceeds; it lasts several seconds, then seems gradually to die away.

The female lays five or six eggs, in colour like those of *Perdiz grande*. The valley of the Rio Negro, usually nine or ten miles in width, is a flat plain, resembling the Buenos-Ayorean Pampa; and wherever long grasses and reeds abound the call-note of the *Perdiz comun* is heard winter and summer; but outside of the valley I have never met with it.

The *Perdiz chico* is nowhere very numerous, but seems thinly and equally distributed everywhere on the high bush-covered tablelands, and, like the *Martineta*, is partial to places abounding in thin scrub. They have a shy disposition, and, when approached, spring up and run away with the same appearance of terror exhibited by the *Martineta*. Sometimes, when running, they utter low whistling notes like the *Perdiz comun*; their flight is higher, and produces far less sound than that of the *Perdiz comun*. They have but one call-note—a succession of short notes, like those of the other species, but without the quick concluding notes; this call is only heard in the breeding-season. Its eggs are like those of the Pampa bird. It is never found in the moist, grassy places frequented by the *Perdiz comun*.

[As an Appendix to Mr. Hudson's interesting notes I think it will be of use to give a list of the species of which he has sent specimens to me from the Rio Negro, arranged in systematic order. These are:—

- | | |
|---|--|
| PASSERES. | 14. <i>Phleocryptes striaticeps</i> . |
| 1. <i>Turdus falklandicus</i> . | 15. <i>Leptasthenura ægithaloides</i> . |
| 2. <i>Mimus triurus</i> , Lafr. et D'Orb. | 16. <i>Synallaxis sulphurifera</i> , Burm. |
| *3. — <i>patachonicus</i> , Lafr. et D'Orb. | *17. — <i>patagonica</i> , Lafr. et D'Orb. |
| 4. <i>Anthus correndera</i> . | 18. — <i>sordida</i> (Less.). |
| 5. <i>Progne purpurea</i> . | *19. — <i>modesta</i> , Eyton. |
| 6. <i>Gubernatrix cristatella</i> . | 20. <i>Homorus gutturalis</i> (Lafr. et D'Orb.). |
| *7. <i>Diuca minor</i> , Bp. | 21. <i>Rhinocrypta lanceolata</i> . |
| 8. <i>Poospiza nigro-rufa</i> . | 22. <i>Tænioptera coronata</i> . |
| 9. <i>Phrygilus fruticeti</i> . | 23. — <i>rubetra</i> , Burm. |
| 10. <i>Zonotrichia pileata</i> . | *24. — <i>murina</i> , Lafr. et D'Orb. |
| 11. <i>Embernagra platensis</i> . | *25. <i>Cnipolegus hudsoni</i> . |
| 12. <i>Sturnella militaris</i> . | |
| 13. <i>Upucerthia dumetoria</i> . | |

26. *Muscisaxicola mentalis*.
 27. *Stigmatura flavo-cinerea*
 (Burm.).
 28. *Anæretes parulus*.
 29. *Phytotoma rutila*.

PICI.

30. *Colaptes agricola*, Malh.

PSITTACI.

31. *Conurus patagonus*.

ACCIPITRES.

32. *Harpyhaliaëtus coronatus*.
 33. *Buteo erythronotus*.
 34. *Geranoaëtus melanoleucus*.
 35. *Bubo virginianus*.
 36. *Glaucidium nanum*.

ANSERES.

37. *Bernicla magellanica*.
 38. — *poliocephala*.

39. *Erismatura ferruginea*.

HERODIONES.

40. *Phœnicopterus ignipalliatus*.
 41. *Ibis melanopis*.

COLUMBÆ.

42. *Columba maculosa*.

GRALLÆ.

43. *Ægialitis falklandica*.
 44. *Oreophilus totanirostris*.

BRACHYPTERI.

45. *Podiceps major*.
 46. — *rollandi*.

TINAMI.

47. *Eudromia elegans*.
 *48. *Nothura darwini*, G. R. Gray.

So far as I know, two naturalists only have hitherto collected birds in this locality—the late Professor d'Orbigny and Mr. Darwin; and the only authorities we have to refer to, on the birds of this district, are the former's 'Voyage dans l'Amérique Méridionale,' and the third volume of the 'Zoology of the Voyage of the Beagle.' It would appear, however, that one or other of his predecessors were fortunate enough to obtain specimens of nearly all the birds peculiar to the district, leaving to Mr. Hudson only the little *Cnipolegus*, which I have named after him.

The total number of species in Mr. Hudson's collection from the Rio Negro is forty eight. Of these the following seven, so far as our present knowledge extends, have not been met with elsewhere:—

Mimus patachonicus.
Diuca minor.
Synallaxis patagonica.
 — *modesta*.

Tænioptera murina.
Cnipolegus hudsoni.
Nothura darwini.

So far as we can judge from Mr. Hudson's collection, the avifauna of this part of Patagonia is more akin to that of the district round Mendoza, in the extreme west of the Argentine Republic, than to that of the vicinity of Buenos Ayres. In Mr. Hudson's collection we find examples of the following species which are also met with in the former, but not in the latter locality:—*Mimus triurus*, *Progne purpurea*, *Homorus gutturalis*, *Rhinocrypta lunceolata*, *Stigmatura flavocinerea*, *Phytotoma rutila*, and *Eudromia elegans*.

The Chilian element in this branch of the avifauna of the Rio

Negro seems to be not quite so decided, being represented only by *Turdus falklandicus*, *Phrygilus fruticeti*, *Sturnella militaris*, *Glaucidium nanum*, and *Diuca minor*, a small representative form of *Diuca cinerea*. These have, in all probability, come up from the south, the avifauna of Southern Patagonia being almost purely Chilian.—P. L. S.]

4. Descriptions of two new Pheasants and a new *Garrulax* from Ningpo, China. By R. SWINHOE, F.Z.S., H.M. Consul at Ningpo.

[Received March 18, 1872.]

From the mountainous region of this province (Che-Kiang) I have procured a truly beautiful Pheasant, perhaps the loveliest of that lovely group. It is smaller than *Phasianus torquatus*, and has comparatively shorter wings and longer tail. The colouring of its head and tail recall *P. reevesii*, its coppery back and breast the *P. scemmeringii* of Japan, and the glowing maroon on its scapulars the *Euplocamus swinhoii* of Formosa; but its curiously marked lower back and white-barred wing are suggested by no other species of this family to my knowledge, and its white underparts no other true Pheasant possesses. Its mate is a smaller bird, and in coloration more of a Grouse than a Pheasant; but in her black under neck and in the marks of her lateral rectrices she shows her relationship to her lord. Possessed of so many striking characters, it would be easy to find an appropriate name for so marked a species; but on glancing down the list of Pheasants I find that not one bears the name of Elliot; and it strikes me it would be a wrong to allow his magnificent work on the group to close without the figure of a bird dedicated to himself: I therefore propose to name this firstfruit of my researches in this Province

PHASIANUS ELLIOTI, sp. nov.

Male.—Crown of head dusky olive, centred darker; a white streak over eye, narrowly bordered with black; face-skin shaped and coloured like that of *P. torquatus*, but quite bare; lower eyelid covered with minute white feathers, edged below with black; sides and back of neck bluish grey, becoming white as it descends downwards and sideways; ear-coverts deep olive-grey, the feathers rather long and disintegrated; feathers on rostral edge of face-skin, chin, and throat black, burnished with steel-blue as it descends to edge of breast and forms a narrow collar round white tippet of neck. Back and breast yellowish chestnut, deeper round the collar and on lower breast; each feather with a crescent of black across its centre, and with broad rounded loosely webbed margin reflecting a rich metallic golden hue; those of the lower breast crossed with black and with white; belly pure white, the flank-feathers being irregularly barred

with black and white, sometimes associated with chestnut; axillaries white, marked with brown; under tail-coverts very deep chestnut, with more or less black. Upper scapulars black, broadly tipped with white, forming a broad shoulder-bar; the rest of the scapulars and the lesser wing-coverts deep maroon-chestnut, the margins of the feathers reflecting a fiery metallic tint; a broad daub of steel blue-black occurs on the shoulder at the edge of scapulars; greater wing-coverts deep chestnut, with a black bar succeeded by a broad white tip, forming a very distinct white band across the wing; tertiary quills coloured in the same manner, but with the tips tinged with yellowish and mottled with black; secondaries similar to last, with inner or hidden half of feathers blackish brown, and the broad half of outer web mottled with same; primaries brown, the outer webs and tips more or less mottled reddish buff; lower back and rump steel-black, beautifully barred with white, each feather having a central bar, a more or less distinct basal bar, and a tip of white; some of these feathers near the tail are tipped with cream-colour instead of white. Upper tail-coverts grey, minutely mottled with black, with broad bars of chestnut bordered with black. Tail barred alternately with stone-grey ($\frac{1}{2}$ inch) and chestnut (1 inch), the latter bordered basally with black; on the lateral rectrices the black border broadens, and some of the bands are bordered both on forward and basal edge.

Fresh male shot towards end of November 1871.—Entire length 30 inches; tail 17·5, of sixteen greatly graduated feathers, the two centrals exceeding the next by 5·75; wing 9 inches; tarse 3; middle toe and claw 2·4. Bill lemon horn-colour; iris light chestnut; legs satiny bluish grey, or pale clear lead-colour; face-skin bright scarlet; spur long and sharp. Crop crammed with seed-pods, seeds, berries, and leaves in much variety. Served on table its flesh was white, firm, close-grained, and tender, but to my taste not equal in flavour to that of the *P. torquatus* about Ningpo.

Female.—Skin round eye bare and crimson, sprinkled with a few small feathers; lower eyelid clothed with minute cream-coloured feathers; loreal space and head reddish cream, with the crown chestnut-brown, the feathers centred with black; throat and under neck black; face and rest of neck grey, washed with fawn-colour, the feathers below the bare skin dotted with black; breast fawn-colour, the feathers margined with white and banded with black spots; belly white, the flanks irregularly barred with dusky fawn-colour, and occasionally with narrow black, some feathers having white central streaks; under tail-coverts black, banded at times with deep chestnut, and all broadly tipped with white; axillaries fawn, with cream-white margins, the under wing-coverts having such margins bordered inwardly with blackish. Dorsals greyish chestnut, with an arrow-head centre of white to each, and one narrow and one broad bar of black with a tip of olive grey; scapulars light yellowish brown, mottled with blackish and patched on inner webs with black and tipped with whitish; wing-coverts chestnut-brown, margined, except about the shoulder, with whitish, and irregularly mottled and

patched with black; winglet and primaries deep brown, the former spotted with reddish chestnut, the latter on the outer webs and at tips with brownish buff; secondaries brown, with whitish margins mottled with reddish buff, the tertiaries being yellowish brown with pale margins mottled with black and with a black patch on each outer web; lower back and rump yellowish brown, mottled with black and buff, the upper tail-coverts having central blotches of black. The two central tail-feathers brownish grey finely mottled, banded with seven obscure bars of darker brown, and terminating with a black spot and white tip; on the next feather chestnut occurs at the base of the spot, and tinges the bar below it; on the next again the two terminal bars are chestnut; and on those that follow the chestnut occupies almost the whole extent of feather, ending with a black bar and a conspicuous white tip.

Fresh female shot towards end of December 1871.—Entire length 20 inches; wing 7·9; tail 6·8, of sixteen feathers, the four centrals equal and longest, the rest pretty equally graduated about half an inch between each. Iris reddish brown; bill ochreous horn-colour; legs light leaden, with pale claws. Tarse 2·5; middle toe and claw 2·25.

The same mountains have also yielded a Pucras Pheasant remarkable for the absence of the golden neck-spot which adorns the *Pucrasia xanthospila* of Northern and Western China (Manchuria to Szechuen). It is of the same model as the other two closely allied species, *P. macrolopha* of the Himalayas and the above-mentioned, but differs sufficiently from either to be recognized as a third race of this curious type. I propose to dedicate this discovery to Mr. Charles Darwin.

PUCRASIA DARWINI, sp. nov.

Male.—Head coloured as in the other two, but the bronze encroaching more on the crown; central occipital crest yellowish brown, with central yellowish streaks; lower eyelid covered with minute pure white feathers; white spot on side of nape as usual. Feathers of the hind neck white, delicately shaded over, and with four black streaks converging to tip; greyer on the back and rump, the lines opening into mottling; some of those covering the rump having a V-mark of black with pale yellowish centre and light chestnut shading. The long uropygials and central tail-feathers greyish white, with a broad margin of chestnut, flanked inwardly with black and outwardly with narrow white. Rectrices pale French or Kestrel grey, bordered along the sides with black, edged with grey, and barred at the end with black conspicuously tipped with white; in the outer feathers the black border is confluent with the bar, in the more central it is broken by the grey extending across; all have more or less black about the basal two thirds of the stem. The two central tail-feathers coloured like the tail-coverts, but clearer and brighter. Median feathers of the underparts from the neck downwards deep chestnut as usual, lighter and dingier on the abdomen; lateral feathers reddish

buff, with four converging black streaks, the two inner ones breaking up into mottling; tibial and latero-abdominal with outer streak very broad. Under tail-coverts black, marked more or less with deep chestnut, and tipped with a conspicuous white spot. Scapulars and wing-coverts varying in depth of chestnut tint, and in breadth of black lines; many of the former and secondary coverts black, with yellowish central streak and margined with chestnut. Primary quills brown, margined with buff; secondaries more mottled, with the edging more chestnut; tertiaries mottled and patched with buff, chestnut, and black, with yellowish central streak; axillaries and under wing-coverts mottled minutely, and the former streaked with light black.

Compared with a specimen of *P. xanthospila* from Pekin, occipital crest much darker, some of the feathers with a central yellow streak; cuneate feathers of the neck much shorter, without tinge of yellow, those of back and rump much broader; sides of the body washed with a warm sienna instead of lemon-white, and more narrowly streaked with black; rump-feathers shorter and broader, mottled instead of streaked with black; a single line of black feathers running down the middle of the rump, margined with grey and patched in the centre with chestnut with a pale streak running through; of a larger size, with larger legs and feet; wings and tail differ in detail of colour and markings.

Fresh male shot about the middle of December.—Length 24 inches; wing 9·25; tail 9·5, consisting of fourteen rectrices and two centrals, which in appearance are but a continuation of the tail-coverts advancing *gradatim* to cover the tail; tarse 3·4; middle toe and claw 2·9. Bill black; iris deep brown; legs and toes deep blackish grey. Crop full of bamboo-leaves, with a leaf or two of other trees and a few berries.

A younger bird with short spur has the chestnut on belly much paler, the black of the throat is mottled with white, and the crown of the head is browner.

Fresh female shot in beginning of January 1872.—Entire length 19·25 inches; wing 8; tail 6; tarse 2·9, with a tubercle on the inner side towards its backward edge, ·6 above hind toe; middle toe and claw 2·5. Bill blackish brown on whole of upper mandible and tip of lower, bluish grey on rest of latter; inside of mouth yellowish flesh-colour, yellower on the tongue, which is broadly sagittate; skin round eye deep purplish brown; lower eyelid covered with minute white feathers; legs and claws light leaden, with a faint yellowish tinge; claws pale yellowish brown.

Closely resembling the female of *P. xanthospila*. The feathers of the underparts are marked more distinctly with black. Much more black occurs on the vent-feathers, and the chestnut there is much deeper-coloured; the dorsals are a great deal more blotched with black; and the line of black-spotted feathers extends down the rump as in the male; the wing is more richly marked and mottled; and the tail presents some differences.

I will take the opportunity of introducing a new *Garrulax* from the same mountains as the above. It belongs to the group of necklaced Laughing-Thrushes, and has close allies in *G. pectoralis*, Gould, and *G. moniliger*, Hodgs., of the Himalayas.

GARRULAX PICTICOLLIS, sp. nov.

Loral region, extending into a streak over the eye, and a broad mark under eye, throat, and middle of the belly white; cheek black, spotted with white; a black line from behind eye and another from base of bill meet round the ear and extend in a broad band down side of the neck nearly meeting on breast, where it is broken by buff feathers, which are only tipped with black; upper parts yellowish olive-brown, rufous on the back of the neck and hind edge of the necklace; sides of the breast and belly robin-rufous, paler on the tibiae and vent. Wings coloured like the back; the primaries and secondaries with their inner webs blackish brown, the outer webs of many of the former olive-buff near their tips, otherwise margined with dark olive-brown; axillaries buff, with a few black spots on the carpal edge of wing, and dark primary under-coverts; under wing whitish, tinged with buff. Tail of twelve feathers, the centrals coloured as the back, with indistinct bars of deeper shade; the fifth pair similar but with reddish ochre tips, the remainder with broad oblique black band, very broadly tipped (one inch and more) with rufous buff.

The above description is taken from an adult female procured near the end of November 1871. The fresh bird measured, length $12\frac{1}{2}$; wing 5.4, the five first quills graduated, 5th, 6th, and 7th equal and longest, 8th a little shorter; tail 5.75, outermost feather 1.6 the shortest, outer five graduated, the fifth and centrals equal; tarse 1.9. Upper mandible and broad tomial edge of lower bluish black, rest of lower horny, tinged with bluish; rim of eyelid blackish grey; iris chestnut; inside of mouth black; legs leaden, with paler claws.

Another female, apparently younger than the last, has the necklace deep bluish grey shaded with black where it crosses the breast; inside of mouth dark green, with flesh-coloured tongue; rim of eyelid tinged with yellow. Length 12.9; wing 5.2; tail 5.6; tarsi 2.2.

A bird, still younger, of the male sex has the inside of mouth orange-yellow; rim of eyelid the same; necklace mixed with much bluish grey and widely broken on breast, the intermediate feathers not tipped with black; underparts light.

The greater or less amount of black and grey in the necklace seems due to individual variation, rather than to sexual difference or to age.

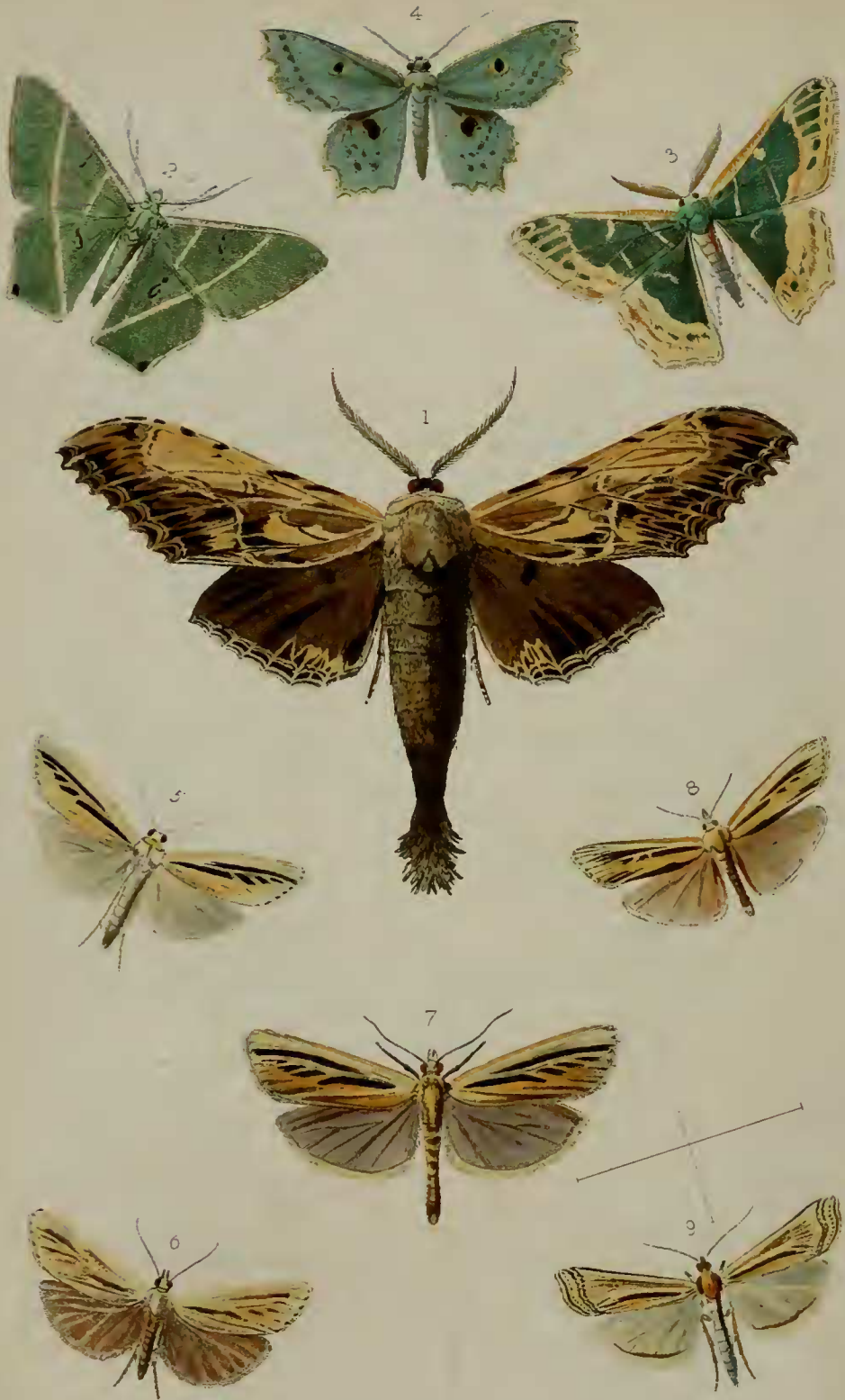
The stomachs of the specimens dissected contained smooth caterpillars, grasshoppers, seeds, and pulp of fig-like berries.



E. W. Robinson. Del. et Sc. 1872.



Illustration of a moth, likely a species of the genus Aegeria.



E.W. Robinson Del. et Sc. 1872

5. Descriptions of New Indian Lepidoptera.

By FREDERIC MOORE.

[Received March 19, 1872.]

(Plates XXXII.—XXXIV.)

Tribe PAPILIONES.

Subfam. SATYRINÆ.

Genus LETHE, Hübn.

LETHE SIHALA.

Male. Upperside dark greenish brown: fore wing with two very indistinct or obsolete dusky white apical spots, and a tuft of long blackish brown hairs near posterior angle; hind wing with a marginal series of indistinct black spots. Underside: basal half dark brown, outer half pale brown, being divided on the fore wing by an oblique chalybeate streak, and on the hind wing by a medially produced dark brown line; a submarginal series of four very indistinct ocelli on fore wing formed of a central black dot and two chalybeate rings; a series of six larger ocelli on hind wing, formed of a black spot with a white central dot and fulvous outer ring, each being again encircled by a chalybeate border; both wings also with a dark brown chalybeate-bordered subbasal transverse line.

Female. Upperside brown, palest at the base: fore wing with a paler brown streak along hind margin; a broad white medial band obliquely from costa and terminating before a white spot near posterior angle; a small white apical spot and two indistinct streaks below it; an indistinct series of blackish submarginal spots: hind wing with a submarginal series of five black spots, the middle spot being very small, the upper spots with broad irregular whitish brown borders, the two lower with pale brown rings and white centres. Underside brown at base, outer borders paler; oblique band as above: hind wing as in male: subbasal transverse line chalybeate-bordered, the transverse irregular medial line with whitish brown outer border.

Expanse, ♂ $2\frac{1}{4}$, ♀ $2\frac{1}{2}$ inches.

Hab. Newera Eliya, Ceylon. In Coll. Capt. Hutchison and F. Moore.

Note.—Nearest allied to *L. dynsate*, Hewits.

Genus CALLEREBIA, Butler.

CALLEREBIA ORIXA.

Male. Upperside dark chocolate velvety brown, with an indistinct narrow submarginal black line: fore wing with a large subapical ocellus, composed of a round black spot encircled by a broad bright ferruginous ring, and centred with two white dots: hind wing with a small similar ocellus near anal angle. Underside brighter brown:

fore wing mottled at the apex; ocellus as above, with a posterior dusky border; hind wing with numerous greyish white transverse short strigæ, which are most numerous from the abdominal margin and less frequent before and below the apex; two very small contiguous anal black spots encircled by a ferruginous ring, each without a central white dot.

Expanse $2\frac{1}{4}$ inches.

Hab. Khasia Hills (*Major Godwin-Austen*). In Coll. F. Moore.

This species may be known from *C. annada* by the ocellus on the fore wing being twice as large, much more prominent, and brighter-coloured.

Genus LIBYTHEA, Fabr.

LIBYTHEA RAMA.

Differs from *L. myrrha* in being somewhat smaller, the fore wings less falcated below the apex, the upperside having the discoidal streak and continuous spot very narrow, and the two sets of subapical spots widely separated and ferruginous white; the streak on the hind wing very narrow, short, and placed in the middle of the wing.

Expanse $1\frac{7}{8}$ inch.

Hab. Ceylon. In Coll. Capt. Hutchison and F. Moore.

Subfam. NYMPHALINÆ.

Genus CETHOSIA, Fabr.

CETHOSIA MAHRATTA.

Papilio cyane, Cram. Pap. Exot. iv. pl. 295. f. C, D. (*nec* Drury).

Male. Upperside bright fulvous red: fore wing with the apical half, transverse discoidal streaks, and spots between the lower veins black; a broad subapical oblique white band, crossed on its lower part by two black spots which form part of a transverse discal series, the two upper and lower ones of which are conical and inwardly ringed with white; beyond these is a submarginal row of small white spots and a marginal series of white angles: hind wing with the anterior and exterior margins black, the latter with a series of white angles; three transverse discal series of black spots, the inner series small and irregularly disposed, the outer row oval, each ringed with white and bordered outwardly by a black lunule. Underside fulvous red basally, fulvous yellow exteriorly; exterior margins with black-bordered, clearly defined, white angles, each angle having a white streak pointing inwards: fore wing with the oblique subapical white band and transverse discal series of oval white-ringed black spots as above, with a parallel outer row of white-bordered black lunules; transverse discoidal and discocellular streaks, small basal spots, three small spots beyond the cell, and spots between the veins below the cell black, the latter series interspaced with pale bluish green: hind wing with subbasal transverse black streaks, three discal rows of black spots, the outer row of spots conical and broadly white-bordered, and having each a contiguous

outer small black lunule; interspaces of subbasal streaks and inner discal rows of spots pale bluish green.

Female with markings as in male, but blacker and more prominent, the hind wing on the upperside having the black borders broader, the discal series of black oval spots larger and partly confluent with the inner series, the outer black lunules being bordered with a mixed white and fulvous lunule; head and thorax fulvous brown; abdomen fulvous.

Expanse, ♂ $2\frac{3}{4}$, ♀ $3\frac{1}{2}$ inches.

Hab. Malabar, S. India. In Coll. F. Moore.

Nearest allied to *C. nietneri*, Felder, Voy. Novara, pl. 48. f. 5, 6.

Genus CIRROCHROA, Doubleday.

CIRROCHROA THAIS.

Papilio thais, Fabr. Mant. Ins. p. 64 (1787); Ent. Syst. iii. p. 149.

Cirrochroa thais, Butler, Catal. Fabr. Lep. Brit. Mus. p. 116 (1869).

Male and female. Upperside pale ferruginous, glossed with green at the base: fore wing with a prominent medial transverse black line, which is oblique and zigzag in front of the cell and lunular hindward; exterior margin broadly dusky black and traversed by a double row of ferruginous lunules, the marginal row obsolete at the apex; a dusky streak lining the discocellular vein: hind wing with a large round white spot on anterior margin, from which proceeds the medial transverse black lunular line, between which and the exterior margin is a parallel row of six small black spots, two dusky lunular lines and a third outer line. Underside pale ferruginous brown in male, brown in female, with a transverse medial irregularly dentated purple-white glossy band on both wings, the outer margin of the band being straight, and the dentations disappearing towards anal angle of hind wing; transverse row of black spots on hind wing smaller than on upperside, marginal dusky lunules hardly visible.

Expanse $2\frac{1}{4}$ inches.

Hab. Ceylon; S. India. In Coll. British Museum and F. Moore.

Note.—The above is the description of the insect which, according to Mr. Butler's determination, is the *C. thais* of Fabricius.

CIRROCHROA LANKA.

Male. Upperside bright ferruginous: fore wing with medial transverse black line, which is oblique in front of the cell, nearly obsolete hindward; marginal band black, traversed by an inner row of ferruginous lunules, the outer series being more or less obsolete: hind wing with the white spot on the anterior margin large, the median transverse line from it faintly defined; the parallel row of black spots, outer and second marginal lines prominent. Underside dusky ferruginous, somewhat fulvous at the base, glossed with purple-grey; a broad transverse medial prominent purple-white

glossy band; indistinct lunules on outer margin of wings with purple-grey borders; black spots on hind wing prominent.

Expanse $2\frac{1}{2}$ inches.

Hab. Ceylon and S. India. In Coll. F. Moore.

CIRROCHROA MITHILA.

Male. Upperside pale ferruginous: fore wings with the blackish marginal band narrow, its inner row of lunules palely defined; medial-transverse line scarcely visible on either wing; the row of black spots, white spot on anterior margin, and outer marginal lunular lines of hind wing also very palely defined. Underside dull testaceous, glossed with greyish purple; medial band obsolete, its place faintly defined by a dusky straight outer streak and narrow inner line; spots on hind wing partly obsolete.

Expanse $1\frac{3}{8}$ inch.

Hab. Bengal. In Coll. F. Moore.

Genus CYNTHIA, Fabr.

CYNTHIA ASELA.

Male. Upperside golden yellow, palest across the disk: fore wing with dusky black discoidal streaks, medial transverse irregular line, and two marginal zigzag lines; parallel to the inner marginal line is a row of ill-defined small black spots, the apical spot being pale-centred: hind wing with dusky black transverse medial line, two marginal lunular lines, and two submarginal white-centred ocelli. Underside uniform yellow outward from medial dusky line, the base suffused with ochry red; basal streaks bright red: fore wing with three contiguous apical white spots, inner marginal straight pale dusky red line, almost obsolete outer marginal zigzag line; a discal transverse zigzag line on both wings; marginal lunular lines and extreme margin of hind wing from tail to anal angle chestnut-brown; a transverse streak passing the ocelli on hind wing.

Female. Upperside greyish blue, this colour pervading the wings to beyond the medial band, the margin being blackish brown; medial white band on hind wing terminating at second subcostal vein. Underside similar to *C. erota*.

Expanse, ♂ $3\frac{1}{2}$, ♀ 4 inches.

Hab. Ceylon. In Coll. British Museum and F. Moore.

Genus SYMBRENTHIA, Hübn.

SYMBRENTHIA BRABIRA.

Male. Upperside black, with very broad irregular-margined orange-red bands, disposed as in *S. hypselis*. Underside deep yellow: fore wing imperfectly tessellated with black at the base, below and at the apex, and on the middle: hind wing tessellated at the base and on abdominal margin; the submarginal band formed

of narrow lunular lines ; a marginal series of narrow lunules, of which the third from the angle is metallic green.

Expanse $1\frac{3}{4}$ inch.

Hab. N. India. In Coll. F. Moore.

SYMBRENTHIA NIPHANDA.

Male and female. Upperside dark fuliginous brown : fore wing with a testaceous elongated discoidal streak, an oblique subapical irregular streak, a small apical lunule, a broad band extending obliquely from near posterior angle to abdominal margin of the hind wing, below which band is a submarginal lunular band. Underside pale testaceous yellow : fore wing tessellated with black along base of costa, at the apex, obliquely from middle of outer margin, and across the base of the hind wing, broadly from lower part of abdominal margin, and then decreasing upward towards the angle, beneath which is a series of broad metallic-green lunules with black double borders ; outside these is a marginal band, the middle portion being metallic green. The spaces representing the streaks and bands of the upperside are very pale and glossy on the underside.

Expanse, ♂ $1\frac{7}{8}$, ♀ $2\frac{1}{4}$ inches.

Hab. Sikkim Himalayas. In Coll. F. Moore.

Genus VANESSA, Fab.

VANESSA RIZANA.

Male. Differs from *V. cashmirensis* in being a smaller and more compact insect, and having the fore wing less produced at the apex ; markings and colours disposed as in that species, but more clearly defined and the colours much brighter : fore wing with the red colour near the base descending to near the submedian vein, the posterior black spot being quadrate, well defined, and broadly bordered outward with clear yellow, this colour also bordering the two upper discal spots ; submarginal black border narrow : hind wing with the black base bordered outwardly by clear yellow ; the submarginal row of dentate blue-centred black lunules being without the broad inner dusky border. Underside darker than in *V. cashmirensis* ; markings similar.

Expanse $1\frac{7}{8}$ inch.

Hab. Cheeni (9000 feet), Middle Kunawur, N.W. Himalaya (*Capt. Beckett*). In Coll. F. Moore.

Genus GRAPTA, Kirby.

GRAPTA AGNICULA.

Male and female. Upperside bright fulvous red ; both wings with prominent black markings disposed as in Cashmere specimens of *G. c-album*, excepting that in the fore wing the basal spot within the cell is here broken up into two well-separated spots, and the marginal band in the male is nearly obsolete at the apex. Female with a broader marginal blackish-grey band, the band on the fore wing bordered by an inner row of yellowish spots, and that on the hind

wing by a medial row of yellow spots. Underside very dark greyish brown, brownest at the base within the irregular medial transverse line, and covered with minute black strigæ; a transverse discal row of hardly perceptible small black spots with pale borders; a white comma-like mark on hind wing.

Expanse $2\frac{1}{8}$ inches.

Hab. Katmandu, Nepal; Goolmurg, N.E. of Cashmere. In Coll. Capt. A. M. Lang and F. Moore.

Genus LEBADEA, Felder.

LEBADEA AUSTENIA. (Plate XXXII. fig. 1.)

Male. Upperside dark chocolate-brown, with purple reflections: both wings crossed by a pale lunular band, extending from the costa of fore wing beyond the cell to hind wing above the anal angle; exterior to this is a transverse series of pale-bordered dark brown lunules, those on the fore wing being most prominent and zigzag from the costa, where they are white-bordered, and thence decreasing on to the hind wing; space outside these to exterior margin pale brown with a dark brown submarginal and marginal line; cell of fore wing crossed by six and that of hind wing by four black streaks; cilia white. Underside greyish brown, whitish grey at base; marked as above, but having the outer band with all the lunules white-bordered, except the two lower ones on both wings, which are nearly black. Palpi, legs, and body beneath greyish white.

Expanse 3 inches.

Hab. Khasia Hills (*Major H. H. Godwin-Austen*). In Coll. F. Moore and India Museum, Calcutta.

Genus NEPTIS, Fabr.

Aceris group.

NEPTIS ASTOLA.

Allied to, but differs from *N. aceris* of Europe in having the wings shorter and broader, the markings on the upperside more prominent, and those on the underside more clearly defined by a black border, by which they are all margined.

Expanse, ♂ $1\frac{5}{8}$, ♀ $1\frac{7}{8}$ inch.

Hab. N.W. Himalayas (Simla, Masuri). In Coll. F. Moore.

NEPTIS MAHENDRA. (Plate XXXII. fig. 3.)

Male and female. Upperside black: wings elongated, as in the European *N. aceris*; markings white, and disposed as in that species, but more prominent and broader than in any other known allied species of this group, being broader even than in *N. nandina*. Underside deep brownish ferruginous: markings white, broad, their borders imperceptibly black-margined, not prominently so as in *N. astola* or *N. varmona*: middle band of hind wing narrowing to abdominal margin.

Expanse, ♂ 2, ♀ $2\frac{1}{2}$ inches.

Hab. N.W. Himalaya (Simla, Masuri). In Coll. Capt. A. M. Lang and F. Moore.

NEPTIS VARMONA.

Has much the appearance of the European *N. asceris* in the more elongated form of the wings and in the less defined markings of the upperside, which, in the male, are more like those of the European species than in *N. astola*. The colour of the underside is duller and more yellow, and the black borders of the markings are still more prominent than in *N. astola*, the veins of the fore wing being streaked with black in front of the triangular discoidal spot.

Expanse $1\frac{3}{4}$ to 2 inches.

Hab. Mountains of S. India (Matheran; Neilgherries). In Coll. F. Moore.

NEPTIS EMODES. (Plate XXXII. fig. 2.)

Male and *female*. Upperside blackish fuliginous; markings disposed as in *N. astola*, but smaller, narrower, and of a brownish white colour. Underside bright dark ferruginous red; markings very prominent and black-bordered.

Expanse, ♂ 2, ♀ $2\frac{3}{8}$ inches.

Hab. S.E. Himalayas (Nepal, Sikkim, Khasia Hills). In Coll. F. Moore.

NEPTIS LEUCOTHOË.

Papilio leucothoë, Cram. Pap. Exot. iv. pl. 296. figs. E, F (1792)
Acca matuta, Hübner, Verz. bek. Schmett. p. 44.

This species may be readily distinguished from *N. surakarta* by the outer marginal row of spots on the fore wing being small or nearly obsolete, and the outer lunular band on the hind wing being very narrow, and suffused with brown.

Expanse 2 to $2\frac{1}{4}$ inches.

Hab. Java, Borneo. In Coll. F. Moore.

Note.—Cramer gives "Java, China, and Coromandel" as the habitats of his *P. leucothoë*; specimens from Java only, however, are identical with his figure, those from China and Coromandel being quite distinct species.

NEPTIS SURAKARTA.

A large broad-winged species, similar to *N. leucothoë* of Cramer, but with the markings of the upperside in both sexes broader, larger, and of a yellowish-white colour; the lunular spots of the outer bands are also broader than in that species. Underside bright ferruginous red.

Expanse 2 to $2\frac{1}{4}$ inches.

Hab. Java. Coll. F. Moore.

Columella group.

NEPTIS OPHIANA.

Male. Upperside dark fuliginous black, markings white: fore
PROC. ZOOL. SOC.—1872, No. XXXVI.

wing with very narrow terminally-indented discoidal streak, and large broad triangular spot beyond; a curved discal transverse series of five spots, the two upper obliquely before the apex, the next pair on the middle of the disk, the lower one of which points to the angle of the wing, the fifth elongated and extending along posterior margin; a submarginal interrupted row of whitish lunules with black borders: hind wing with broad inner band, and a less prominent submarginal series of six rather quadrate spots. Underside brownish-ferruginous, markings as above, white, prominent: fore wing with three marginal series of lunules: hind wing with bluish-white basal streak, subbasal fascia, a narrow transverse median discal and a marginal lunular bluish-white line; median band terminating on third subcostal vein.

Expanse $2\frac{1}{2}$ inches.

Hab. Sikkim. In Coll. F. Moore.

Allied to *N. columella*, Cram.

Group — ?

NEPTIS KHASIANA. (Plate XXXII. fig. 7.)

Male. Upperside dark fuliginous black: fore wing with an elongated bluish-white narrow discoidal streak, and small terminal contiguous spot, two oblique subapical spots, and a row of four spots to middle of hind margin; an indistinct submarginal row of very small spots, each side of which has a pale wavy line: hind wing with a narrow subbasal bluish-white band, and a submarginal row of five small spots: cilia alternated with white. Underside dark brown; markings as above, but more prominently bluish white: hind wings with a white band along base of anterior margin, and a pale median and marginal lunular line.

Expanse $2\frac{1}{4}$ inches.

Hab. Khasia Hills (*Major Godwin-Austen*). In Coll. F. Moore.

Vikasi group.

NEPTIS CARTICA.

Male and female. Upperside dark fuliginous black: fore wing with long fuliginous-white discoidal streak, indented at the end of the cell, beyond which is a maculated band curving from costa before the apex to middle of hind margin, and bordered outwardly by a narrow wavy line and a submarginal row of whitish lunules, the marginal line being black: hind wing with straight inner whitish band and less distinct outer submarginal band, between which is a pale brown line, and a similar line along outer margin. Underside dark ferruginous, banded as above, the marginal lines on fore wing more prominent, and tinged with purple, the median discal line and marginal line on hind wing also purple-tinged; base of hind wing with a broad white streak.

Expanse ♂ $2\frac{1}{8}$, ♀ $2\frac{6}{8}$ inches.

Hab. Nepal (*General Ramsay*). In Coll. F. Moore.

Allied to *N. amba*, specimens of which, from the same locality, are under examination.

NEPTIS CLINIA. (Plate XXXII. fig. 5.)

Male. Upperside black; markings white: fore wing with a rather broad discoidal and short contiguous streak; curved discal band of broad closely united spots; marginal black-bordered lunular line indistinct: hind wing with a very broad straight inner band and narrow brownish-white outer lunular line. Underside bright ferruginous, markings as in *N. soma*, but very prominent.

Expanse 2 inches.

Hab. Bengal. In Coll. F. Moore.

NEPTIS ADIPALA. (Plate XXXII. fig. 8.)

Male. Upperside fuliginous black; markings white: fore wing with a narrow discoidal and elongated triangular contiguous streak; spots of curved discal band small; a submarginal row of black-bordered lunules: hind wing with moderately broad inner band, and outer band of narrow quadrate spots. Underside deep bright ferruginous: fore-wing markings as above: hind wing with the bands and two basal streaks similar to those of *N. nandina*, except that the narrow outer line is in this nearer the margin.

Expanse 2 inches.

Hab. Khasia Hills (*Major Godwin-Austen*). In Coll. F. Moore.

NEPTIS SUSRUTA. (Plate XXXII. fig. 4.)

Male. Upperside brownish black: fore wing with ferruginous white narrow discoidal and attenuated contiguous streak; curved discal band of small and widely separated spots, an ill-defined black-bordered submarginal lunular line: hind wing with white inner band, and ferruginous white outer narrow lunular curved band. Underside deep ferruginous; markings prominent, and suffused with pale ferruginous; those of the hind wing similar to *N. soma*, but narrower.

Expanse 2 inches.

Hab. N. India. In Coll. F. Moore.

Zaida group.

NEPTIS VIRAJA. (Plate XXXII. fig. 6.)

Male and female. Upperside black; markings ferruginous: fore wing with a broad discoidal streak extending to two thirds the length of the wing; a large broad subapical oblique spot, and a broad band beneath extending to hind margin; an indistinct pale brown marginal line: hind wing with a broad transverse inner band and narrow submarginal band. Underside ferruginous brown in male, blackish ferruginous in female; markings as above, pale glossy ferruginous white, and tinted with blue in some lights; a marginal line on both wings; a narrow median discal line, basal and a subbasal streak on hind wing bluish white.

Expanse, ♂ $2\frac{1}{8}$, ♀ $2\frac{1}{2}$ inches.

Hab. N.E. Bengal. In Coll. F. Moore.

Allied to *N. radha*.

Genus ATHYMA, Westw.

ATHYMA ZEROCA.

Male. Upperside velvety blackish brown; a broad median bluish-white band crossing from middle of fore wing to abdominal fold of hind wing: fore wing with two, and in some specimens three, subapical oblique white spots; both wings with a pale brown-bordered blackish marginal line. Underside brownish ferruginous; bluish-white median band and subapical spots as above: fore wing with a straight bluish-white discoidal streak, contiguous dentate spot, and marginal lunular lines; a blackish spot near base of hind margin: hind wing with a subbasal bluish-white streak, a submarginal and a paler marginal line; abdominal margin bluish grey; between the median band on both wings and submarginal line is a blackish maculated fascia.

Expanse 2 inches.

Hab. Khasia Hills (*Major Godwin-Austen*). In Coll. F. Moore.

Allied to *A. selenophora*.

Subfam. PIERINÆ.

Genus METAPORIA, Butler.

METAPORIA CAPHUSA.

Male. Upperside brownish black (female brown): fore and hind wings with greyish-white streaks between all the veins, those on the disk being medianly divided anteriorly and partially so to the hind margin, thus forming two series. Underside vinous brown; streaks as above, those of the female being yellowish on the hind wing, which has also a bright yellow basal spot.

Expanse, ♂ $2\frac{3}{4}$, ♀ $3\frac{1}{2}$ inches.

Hab. N.W. Himalayas (Masuri, Simla, Kunawur). In Coll. F. Moore.

Allied to *M. phryxæ*, Boisd., but differs in being darker, the white markings forming only narrow streaks between the veins, and terminating some distance from the outer margins; the costal margin is also black.

METAPORIA ARIACA.

Male. Allied to *M. agathon*, Gray, and the preceding, and may be distinguished from the latter by its being much blacker in colour, the white streaks still narrower, smaller, well defined, and more prominent, the transverse series having a wide interspace between them, the streak within the cell and base of posterior streak of the fore wing being dusky black.

Expanse 3 inches.

Hab. Himalayas (Nynec Tal district) In Coll. F. Moore.

Genus *ERONIA*, Hübn.*ERONIA PINGASA*.

Male. Upperside fuliginous brown: fore wing with a basally divided streak within the cell, short spaces between the veins beneath it, and a narrow streak between the two subcostal veins pale blue, these streaks extending only to the middle of the disk: hind wing with the spaces between the veins from the base to near middle of the disk pale blue. Underside paler fuliginous brown, the markings pale glossy blue, but less prominent than above, there being also a marginal series of pale bluish rounded spots.

Expanse $2\frac{3}{4}$ inches.

Hab. Canara, S. India. In Coll. F. Moore.

Genus *PIERIS*.*PIERIS VIPASA*.

Female. Upperside white: fore wing with a large quadrate discal black spot, which is crossed by the discocellular vein; a black apical patch with four marginal white spots; a small indistinct dusky spot near posterior angle: hind wing with an ill-defined blackish anterior marginal spot, below which are two white-centred black apical spots, the black of which, however, does not unite on the outer margin; beyond is a small indistinct blackish marginal spot. Underside: fore wing with greyish-brown markings as above: hind wing with the veins throughout and the base of anterior margin orange-yellow; greyish-brown markings disposed as in *P. daplidice*, but with the white intervening parts broader.

Expanse $1\frac{7}{10}$ inch.

Hab. Derajat, Punjaub; N.W. India. In Coll. F. Moore.

Allied to *P. daplidice*, specimens of which, both European and from the N.W. Himalayas, are before me.

PIERIS TAPROBANA.

Male. Upperside white: fore wing with a broad black marginal band extending from one third before the apex to posterior angle, the inner border being irregular and having two or three small white apical streaks; base of costa dusky black, discocellular streak black: hind wing with a broad marginal black band, with indistinct white spots; a black lunule and a spot before the apex.

Female. Upperside as in male, with the black marginal and costal bands broader, the discocellular streak joining the band by the black extending along the veins and forming three oval white spots. Underside with the bands as above, blackish brown or dark vinous brown, this colour also extending along the veins on the hind wing, the intervening spaces and a series of submarginal triangular spots on this wing and the apical streaks on fore wing being bright orange-yellow; base of fore wing also suffused with yellow.

Expanse 2 inches.

Hab. Ceylon. In Coll. Capt. Hutchison and F. Moore.

Allied to *P. mesentina*, of which it is the Ceylon representative.

Genus *THYCA*, Wallengren.*THYCA DEVACA*.

Female. Upperside fuliginous brown: fore wing with indistinct whitish streaks in the cell and between the veins, the latter terminating in a band of elongated spots across the apex: hind wing with a broader whitish streak between the veins, the anterior margin and the space within the cell being tinged with pink; the streaks terminating in a submarginal series of indistinct maroon-brown spots; abdominal margin broadly buff-white. Underside: fore wing as above, the markings well defined and white, the three upper apical spots yellow: hind wing with all the veins and outer margin dark brown; the entire space between the costal and subcostal veins, as well as that of the discoidal cell, brick-red; a submarginal series of bright blood-red spots; base of wing, abdominal margin, and space between the veins to the subcostal bright yellow inward and white outward.

Expanse 3 inches.

Hab. Burmah. In Coll. F. Moore.

Allied to *T. hierte*, Hübn., a Burmese female of which is before me, but from which it may be at once distinguished by the prominent brick-red colour at the base of the hind wing.

THYCA BERINDA.

Female. Upperside dark fuliginous: fore wing with a marginal and discal transverse series of elongated indistinct whitish streaks, and a parallel streak near the end of the discoidal cell: hind wing with a bright yellow basal spot, a double series of pale yellowish-white indistinct streaks and a more prominent elongated streak within the cell; abdominal margin vinous-grey. Underside vinous-brown, marked as above, but more prominently; all the markings of the hind wing and three apical spots on fore wing bright yellow; abdominal margin entirely vinous-brown.

Expanse $3\frac{1}{2}$ inches.

Hab. Khasia Hills (*Godwin-Austen*). In Coll. F. Moore.

Allied to the Nepalese *T. horsfieldi*, but differs from the same sex of that species in having the wings more elongated, the hind wing being considerably produced anteriorly.

Genus *TERIAS*, Swains.*TERIAS RAMA*.

Female. Shape of wings as in *T. venata*. Pale yellow, thickly speckled with dusky scales, especially at base of fore wings: a broad brownish-black border on the fore wing, as in *T. venata*: hind wing with a broad brownish-black apical border which is suffused to the middle angle and extends along the marginal line: cilia of fore wing pale brown, of hind wing pale yellow. Underside paler, speckled with dusky scales; two transverse indistinct bands on hind wing, composed of dusky scales.

Expanse $1\frac{1}{2}$ inch.

Hab. Colombo, Ceylon. In Coll. Capt. Hutchison and F. Moore.

Tribe SPHINGES.

Genus PERGESA, Walker.

PERGESA OLIVACEA.

Male and *female* olive-green: fore wing with three subbasal and three discal transverse zigzag lines, the former dusky brown, the latter ferruginous; a prominent discocellular blackish spot with white centre; a suffused chalybeous zigzag-bordered band along exterior margin: hind wing ferruginous black, with a submarginal ferruginous zigzag band: cilia at anal angle white, the rest ferruginous: a narrow white lateral fringe to thorax; abdomen laterally above, wholly beneath, and the underside of both wings yellowish testaceous: discal transverse lines beneath and marginal bands to both wings dark brown, the inner line on fore wing broad and extending along the cell.

Expanse $2\frac{3}{4}$ inches.

Hab. Simla, N.W. Himalayas, 7000 feet. In Coll. Capt. Lang and F. Moore.

PERGESA CASTANEA.

Male. Fore wing dark chestnut-brown, with two indistinct subbasal oblique fasciæ of paler brown, the outer fascia encircling a small black discocellular spot; outer margin of the wing broadly chalybeous-speckled; base of hind margin fringed with greyish brown hairs: hind wing dark cinnamon-brown: cilia of both wings chestnut-brown, and white at the angles: head, thorax, and upper part of abdomen dark chestnut-brown, sides of latter pale cinnamon-brown; thorax with a white lateral line. Underside bright ferruginous brown, with three transverse lunular greyish lines, and greyish-speckled outer margins: legs pale brown: antennæ brown.

Expanse, ♂ $2\frac{1}{2}$ inches.

Hab. Bombay. In Coll. F. Moore and Dublin Nat. Hist. Society.

Genus nov. LANGIA.

Palpi short, thick, densely pilose. Antennæ minutely pectinated. Legs thick, rather short; tibiæ incrassated at the apex; femora of all the legs and fore tibiæ densely pilose, middle and hind tibiæ squamose; middle tibiæ armed with one pair and hind tibiæ with two pairs of contiguous straight sharp spurs. Body robust, thorax broad, abdomen extending half its length beyond the hind wings. Fore wings long, narrow, exterior margin deeply scalloped, costa arched near the apex. Hind wings moderate, slightly scalloped.

LANGIA ZENZEROIDES.

Male mottled grey and brown: fore wing thickly speckled with black and testaceous scales; costa broadly grey, the hind and exterior margins brownish grey, the median space from base to apex whitish testaceous; from the hind margin proceed three blackish

lines which terminate irregularly on the costa before the apex, the middle line being indistinct; a short white exterior submarginal line from posterior angle, and an extreme marginal blackish lunular line with pale inner border: hind wing clear brown from the base, grey along exterior margin, along which is a black lunular line; from the anal angle proceed a short narrow white line and upper black streaks, the space above which is pale and speckled with black: head and thorax grey, with brown median longitudinal streaks and a well-defined black lateral streak; base of thorax densely tufted with black and brown spatulated scales; abdomen and legs greyish black.

Expanse $5\frac{1}{4}$ inches.

Hab. Kotghur (50 miles from Simla), N.W. Himalayas. In Coll. Capt. A. M. Lang.

LANGIA KHASIANA.

Male. Fore wing with the exterior margin deeply festooned; pale testaceous; a broad dark grey costal band extending to near the tip; two black submarginal contiguous bands, the outer one broadest and the inner nearly obsolete on the hind margin; a parallel black discal band which is bifid on the hind margin and there forms an elongated loop, being anteriorly nearly obsolete; between this and the inner submarginal band runs a parallel paler and much less distinct band; and below the grey costa extends a black streak; interspaces of the entire wing from the costa black-speckled, which are most numerous about the looped band, the costa being speckled with testaceous: hind wing brown, greyish along anterior margin and testaceous at anal angle; from the latter extends a short submarginal black streak which is broadest at the angle: exterior margins of both wings with black lunules, each having a grey inner border: head and thorax grey; thorax with narrow longitudinal testaceous median streaks and a broad lateral testaceous-bordered black streak; abdomen brown, speckled with testaceous; legs greyish brown above, tarsi nearly white, all the joints black-tipped; shaft of antennæ blackish grey, pectinations pale testaceous; eyes brown; tips of palpi black, fringed with white, and having each a white-ringed dot in front.

Expanse $5\frac{3}{4}$ inches.

Hab. Khasia Hills (*Major H. H. Godwin-Austen*). In Coll. F. Moore.

Genus SMERINTHUS.

SMERINTHUS DECORATUS.

Female dark olive-brown, suffused with pale pink: fore wing with a large median costal dark brown patch bordered with pale pink and partly enclosing a pale brown reniform discal spot, beneath which is a smaller lobe-shaped darker brown patch; near the apex is a triangular grey patch bordered with dark brown, below which is a short longitudinal diaphanous white streak; between the costal patches are two transverse recurved pale pink lines, the outer one

irregularly bordered externally near the posterior angle with suffused brown streaks: hind wing with a broad black and a narrow pale pink streak from anal angle: abdomen with a dark narrow dorsal line.

Expanse $2\frac{7}{8}$ inches.

Hab. Sikkim. In Coll. Capt. A. M. Lang.

Tribe BOMBYCES.

Subfam. AGARISTINÆ.

Genus EUSEMIA, Dalm.

EUSEMIA FUNEBRIS.

Male black: fore wing indistinctly irrorated with greyish-blue scales, these being disposed in groups along the exterior and posterior borders; within the discoidal cell is a small white subbasal dot and a large transverse spot, and outside the discocellular vein is a small upper and a geminated lower spot; cilia above and below the apex with a white spot: hind wing with a broad subbasal, partly transverse, white band, with scalloped outer margin and an ill-defined or partly obsolete series of submarginal white spots: antennæ, head, thorax, palpi, and legs black, the four latter interspersed with white scales: abdomen black, with red bands and anal tuft, and a white waist-band. Underside as above, with the white spots more defined, the hind wing having an additional basal costal spot.

Expanse $2\frac{1}{2}$ inches.

Hab. Darjiling. In Coll. F. Moore and W. W. Saunders.

EUSEMIA ALBOMARGINATA.

Male and *female* velvety black, with white exterior margins: fore wings with the veins blue-black, an elongated discocellular and a smaller central discoidal steel-blue impressed mark: both wings with the inner margins of the white exterior borders lunular, the black veins extending to nearly the extreme outer margin; cilia white: hind wings with blue reflections. Underside as above, with a light yellow twice-divided central discoidal spot. Body black; a narrow white collar round front of thorax; palpi black, second joint fringed with yellow at the sides; chest and front legs orange-yellow; tarsi and femur black above; middle and hind legs black above, yellow beneath; antennæ black.

Expanse, ♂ $2\frac{1}{2}$, ♀ 3 inches.

Hab. Burmah. In Coll. F. Moore and Dublin Natural-History Society.

Subfam. CHALCOSINÆ.

Genus MILIONIA, Walk.

MILIONIA ZONEA.

Male black, with purplish blue reflections; median and sub-median veins at base of both fore and hind wings smalt-blue; a broad golden-yellow median band across the fore wing; also a broad ex-

terior band of the same colour on the hind wing, which has a marginal series of five black oval disconnected spots: body and legs smalt-blue; antennæ black, slightly setose; anal tuft with some pale yellow hairs.

Expanse $2\frac{2}{3}$ inches.

Hab. N.E. Bengal (*Capt. Sherwill*). In Coll. F. Moore.

MILIONIA LATIVITTA.

Male black; median and submedian veins at base of fore and hind wings smalt-blue; a broad orange-yellow oblique median band across the fore wing: body and legs blue; antennæ slightly setose, brown.

Expanse $2\frac{3}{8}$ inches.

Hab. Sikkim. In Coll. F. Moore.

Allied to *M. glauca*, Cram. Pap. Exot. pl. 368. f. D, from Amboina.

Genus CHELURA, Hope.

CHELURA GLACIALIS.

Male and female whitish hyaline, glossy: fore wing with a dark yellowish-brown band at the base, and a broad tortuous fuliginous-brown transverse median band; the veins at the apex and exterior border margined with fuliginous: hind wing with a costal and a discocellular spot, and exterior border fuliginous brown: head, thorax, and legs yellowish brown; abdomen blackish, with a grey waist-band and lateral streak; antennæ black, bipectinate.

Expanse 2 to $2\frac{1}{4}$ inches.

Hab. Darjiling. In Coll. W. W. Saunders and F. Moore.

Subfam. HYP SINÆ.

Genus NEOCHERA, Hübn.

NEOCHERA TORTUOSA. (Plate XXXIII. fig. 2.)

Female. Fore wing greyish fuliginous; base yellow, with several black spots; a white irregular-margined tortuous inwardly oblique band extending from near the costa to the hinder part of the base, above which is a small costal white spot: hind wing white, with a fuliginous-black anterior marginal line, an exterior marginal row of eight spots, of which those at the angles are the largest, two similar spots from anal angle, a single submarginal spot, and two discoidal spots, the basal one being small and indistinct. Underside white: fore wing with the costa, two discoidal spots, apex, exterior margin, and narrow submarginal maculated band fuliginous black: hind wing as above, with the addition of a small third discoidal and a large costal spot. Palpi and front of head black; thorax and abdomen yellow; thorax with black spots; tegulæ with a longitudinal black streak: abdomen with a dorsal, lateral, and two rows beneath of black spots: antennæ brown; legs fuliginous.

Expanse $2\frac{3}{4}$ inches.

Hab. India. In Coll. W. W. Saunders, Esq.

Genus nov. CALPENIA.

Female. Fore wing elongate, broad at the apex; exterior margin oblique, nearly straight; apex and posterior angle acute; posterior margin three-fourths the length of the costa. Submedian vein with the first branch starting at one fourth from end of the cell and ascending to costa at one fourth from the apex, second branch arising from end of the cell and running parallel with the first to the costa, and sending forth three forks, two to the costa, the other to below the apex; a sixth vein starting from the discocellular vein near the juncture of the second submedian veinlet. Hind wing broad; apex rounded, extending beyond the angle of fore wing; exterior margin slightly angled in the middle. Palpi suberect, slender; second joint rather long; third joint short, conical. Antennæ minutely setose. Body robust, broad. Proboscis short. Legs rather slender, squamose; tibiæ armed with spurs.

CALPENIA SAUNDERSI. (Plate XXXIII. fig. 1.)

Female. Fore wing bluish fuliginous; veins conspicuous; extreme marginal line darker, without gloss, and having five bluish-white, nearly equidistant, outwardly curved, transverse maculated bands, the first of which encloses a small basal yellow spot, the second consisting of six small spots, the third of broad and large spots, the other two being composed of small spots: hind wing bluish white basally, bluish black on exterior half, on which are two marginal series of bluish-white spots. Underside as above: veins conspicuous; the maculated bands more defined, and those on the fore wing confluent basally. Palpi above and antennæ black: head, thorax, and abdomen bright yellow with black spots, those of the thorax longitudinal; the abdomen having a dorsal, two lateral, and one row beneath of square spots, besides five longitudinal streaks on the anal segment above: tegulæ with a white spot; legs fuliginous.

Expanse $3\frac{1}{2}$ inches.

Hab. India. In Coll. W. W. Saunders, Esq.

Genus AGRISIUS, Walker.

AGRISIUS FULIGINOSUS. (Plate XXXIII. fig. 3.)

Female pale greyish fuliginous; the veins exteriorly defined by darker fuliginous lines: fore wing with twelve small black spots at the base, and a recurved linear series of six spots from middle of hind margin to upper end of discoidal cell; above this and more towards the base of the wing are two other spots on the costa: head and thorax with black spots: abdomen above with a narrow dorsal, a broad quadrate outer row, and then a very narrow lateral row of black spots, there being also two broad rows beneath: palpi and antennæ black: fore and middle legs black above, grey beneath; hind pair with the tibiæ and tarsi black beneath.

Expanse $2\frac{2}{8}$ inches.

Hab. India. In Coll. W. W. Saunders, Esq.

Subfam. LITHOSIINÆ.

Genus LITHOSIA, Fabr.

LITHOSIA DISTORTA.

Male and female. Fore wing pale testaceous yellow, suffused in parts with fuliginous brown, yellowish along the costa; a blackish spot on the costa one-third from the apex: hind wing much paler: fore wing of the male with a longitudinal depression or fold along the cell, the subcostal vein being fringed with overlapping broad adpressed scales; apex of the wing distorted, and wrinkled to the extreme margin; hind margin very convex: third joint of palpi and front of head brown: proboscis, top of head, anal tuft, and antennæ yellow; legs brown above, yellowish beneath; thorax brown; abdomen greyish brown; eyes black.

Expanse, ♂ $1\frac{4}{10}$, ♀ $1\frac{5}{10}$ inch.

Hab. Sikkim. In Coll. W. W. Saunders, Capt. Lang, F. Moore.

LITHOSIA NIGRIFRONS.

Male. Fore wing narrow, convex towards base of posterior margin; a longitudinal depression from base to posterior angle, pale pinkish cream-colour; apex and cilia tinged with pale golden-yellow: hind wing slightly paler cream-colour, yellowish exteriorly: front of head blackish brown; top of head, thorax, and abdomen pale golden yellow: legs entirely blackish above; femur and tibia yellowish beneath: third joint of palpi black: eyes jet-black; antennæ setose, brown; wings beneath yellow, fore wing tinged with brown.

Expanse $1\frac{2}{2}$ inch.

Hab. N. India. In Coll. F. Moore.

Genus BIZONE, Walker.

BIZONE GAZELLA. (Plate XXXIII. fig. 4.)

Male and female white: fore wing with several transverse tortuous cinnamon-yellow bands, which in the male are confluent and thus form a series of nine white spots, four of which are costal, three on the hind margin (from the last of which ascends an upper streak), the other two spots being below the third and fourth costal: cilia white: thorax with cinnamon-yellow bands; fore and middle tibiæ with black streaks; tarsi black; palpi black, fringed beneath with white; antennæ brown.

Expanse, ♂ $1\frac{4}{10}$, ♀ $1\frac{8}{10}$ inch.

Hab. Masuri, N.W. Himalaya. In Coll. Capt. A. M. Lang and W. W. Saunders.

Subfam. ARCTIINÆ.

Genus ALOA, Walker.

ALOA NIGRICANS.

Fore wing dark blackish brown: hind wing brick-red; a blackish-brown band on anterior margin and three large connected spots on exterior margin: thorax above, entire body beneath, and

legs blackish brown; femora red above; abdomen red above, with a dorsal and lateral row of blackish spots; tegulæ and a narrow band on front of thorax and head pale testaceous; a black spot on each tegula. Underside of wings as above.

Expanse $1\frac{3}{8}$ inch.

Hab. Bombay (*Dr. Leith*); Deccan (*Dr. Day*). In Coll. F. Moore.

ALOA SIPAHI.

Male and female. Fore wing brown, with numerous more or less confluent reddish-white spots from the base, and extending along the disk to near the apex, above which and proceeding from the costa are two or three sets of three inwardly oblique confluent spots; a row of small spots along exterior margin: hind wing brick-red, with three blackish-brown spots on anterior margin and a lengthened similar spot from anal angle, the latter in some specimens joining the outer anterior spot: thorax brown; head, front of thorax, and tegulæ white; two black spots on front of thorax, one on each tegula, and another on the extreme base of the fore wing; abdomen red, with a dorsal and lateral row of blackish spots; antennæ blackish; legs brown, femora reddish above.

Expanse, ♂ $1\frac{1}{4}$, ♀ $1\frac{3}{4}$ inch.

Hab. Matheran Hill, Bombay (*Dr. Leith*); Deccan (*Dr. Day*); Madras (*W. Elliot*). In Coll. Dr. Leith, F. Moore, and W. W. Saunders.

Genus CREATONOTUS, Hübn.

CREATONOTUS RUBRICOSTA.

Male and female creamy white: fore wing with the costal border above and below red, with or without two black dots ascending obliquely upwards from near the base; a single dot at the lower end of discoidal cell, and a short thin black longitudinal line below the apex: abdomen red above, yellowish beneath, with a dorsal and lateral row of black spots: shaft of antennæ reddish, pectinations of male blackish; legs white, femora red above.

Expanse, ♂ $1\frac{1}{2}$, ♀ $1\frac{1}{4}$ inch.

Hab. Manpuri, North-west India (*C. Horne*); Bombay. In Coll. W. W. Saunders and F. Moore.

Genus SPILOSOMA, Steph.

SPILOSOMA DENTILINEA.

Male whitish testaceous: hind wing suffused with reddish testaceous exteriorly: fore wing with two median transverse interrupted series of black dots, those on the hind margin being the largest; a zigzag black submarginal line from below the apex to near posterior angle; a black dot at base of wing and one also at upper end of cell: hind wing with an ill-defined zigzag blackish line below the apex, and a small rounded black discal spot. Underside: base of fore wing suffused with crimson; markings as above, but

less distinct. Palpi black at apex, basal joint crimson laterally; femora crimson; tibiæ and tarsi black.

Expanse $1\frac{5}{8}$ inch.

Hab. Sikkim. In Coll. F. Moore.

SPILOSOMA BRUNNEA.

Male fuliginous brown, hind wing the darkest; veins of fore wing pale brown, those of hind wing testaceous; fore wing with three transverse pale-bordered, outwardly curved, jet-black maculated bands, the first being one third from the base, the second one third from the apex, the third interrupted below the apex and not reaching the hind margin; a black spot at end of cell, and another at base of costa: cilia of hind wing testaceous: abdomen crimson-red above, brown beneath, with a dorsal and lateral row of black spots; head and thorax pale brown; base of palpi pale brown, with a lateral crimson spot, terminal joint black; femora crimson above, tibiæ and tarsi blackish. Underside of wings mostly fuliginous black, anterior margins dull crimson.

Expanse $1\frac{1}{2}$ inch.

Hab. Bombay. In Coll. Royal Dublin Society and F. Moore.

SPILOSOMA TODARA.

Male reddish testaceous, suffused with pale blood-red on the abdominal half of hind wing: fore wing with a black dot at extreme base, another on the costa at one fourth its length, a third at the upper end of discoidal cell, a more or less distinct spot on hind margin one third from the base, and a pair of spots vertically contiguous one third from exterior angle; from the latter an indistinct blackish recurved band proceeds upward to the costa: hind wing with a large well-defined blackish comma-like discal spot: basal joint of palpi reddish, second and third joints black; antennæ, tibiæ, and tarsi black; femora red above, testaceous white beneath; head and thorax yellowish testaceous; abdomen blood-red above, testaceous white beneath, with a lateral row of black spots, dorsal row hid by the pubescence. Underside: fore wing suffused with blood-red; each wing with a small basal and a large discal black spot.

Expanse $1\frac{3}{4}$ inch.

Hab. Coonoor, Nilghiris (*Dr. F. Day*). In Coll. F. Moore.

Subfam. LIPARINÆ.

Genus PROCODECA, Walk.

PROCODECA TESTACEA.

Male and *female* very pale suffused testaceous; hind wing pale in the male; fore wing of male with a row of very indistinct black submarginal dots; body, antennæ, palpi, and legs brighter testaceous.

Expanse, ♂ $1\frac{2}{10}$, ♀ $1\frac{7}{10}$ inch.

Hab. Bengal. In Coll. W. W. Saunders and F. Moore.

Genus NAXA, Walk.

NAXA PUNCTICILIA.

Male and *female* white, opaque, squamous: fore wing with a black line extending along nearly one half of the extreme edge of costal margin; a black spot in middle of the cell; a row of six black spots on cilia, and a single apical spot on cilia of hind wing: legs streaked with black; pectinations of antennæ pale brown.

Expanse, ♂ $1\frac{2}{8}$, ♀ $1\frac{3}{8}$ inch.

Hab. Nilghiris (*Dr. F. Day*). In Coll. W. W. Saunders and F. Moore.

Genus DEROCA, Walk.

DEROCA MACULATA.

Male. Wings semihyaline, white: fore wings with fuliginous bar-like spots at the base and on the veins along the costa; a marginal and submarginal medianly interrupted series of lunular spots, the two series divided by smaller diamond-shaped spots; a double discocellular spot: hind wing with a medianly interrupted series of fuliginous marginal spots, a less distinct submarginal series and a third bar-like series on the veins: body and legs white; fore and hind legs fuliginous above, with white spots; antennæ fuliginous.

Expanse $1\frac{4}{5}$ inch.

Hab. Masuri, North-west Himalayas, 7000 feet. In Coll. Capt. Lang, W. W. Saunders, and F. Moore.

Genus HYPERCOMPA.

HYPERCOMPA REGALIS. (Plate XXXIII. fig. 7.)

Allied to *Hyp. hera*. Fore wing buff-colour, tinged with ochreous red at posterior angle, with a black elongated spot at base, a fusiform streak along middle of posterior margin, an outwardly oblique tapering band from middle of costa, and another similar band from the apex, between which is a parallel line with a zigzag end, each terminating before the posterior angle, where there are three small spots, and above these a narrow marginal line: hind wing ochreous red, with a marginal row of black spots, of which the one at the anal angle is the largest: palpi ochreous red; antennæ brown; front of head black; top of head and thorax whitish, with a black collar, a maculated band across the middle, and a triangular median spot on the waist: abdomen ochreous yellow. Underside pale ochreous red, tinged with yellow at base and on exterior margin; the median oblique band partly, and the marginal spots on hind wing only visible. Tibia above and tarsi brown.

Expanse 2 inches.

Hab. North India. In Coll. W. W. Saunders.

Subfam. BOMBYCINÆ.

Genus nov. NORASUMA.

Female. Wings elongate: fore wing with the costa very much

arched before the apex, thence abruptly descending and forming an acute apical point; exterior margin oblique, recurved, not scalloped; first subcostal veinlet four-branched, the second, third, and fourth branches starting at one third their length from each other, the second subcostal veinlet starting from the junction of the first with the discocellular, the discoidal veinlet crossing the discocellular and extending within the cell to one third its length: hind wing produced, anterior angle extended beyond the posterior margin of fore wing; exterior margin rounded, very slightly scalloped; anal angle not acute, abdominal margin slightly grooved. Antennæ very short, bipectinate to the tips. Body ample; abdomen with a longitudinal dorsal crest extending its whole length.

Allied to the genus *Bombyx* and *Theophila*.

NORASUMA JAVANICA. (Plate XXXIII. fig. 6.)

Female. Fore wing greyish brown, with a whitish-grey patch above and below the apex; four equidistant, very indistinct transverse discal undulating blackish lines, the outer line with a pale exterior border, the two median lines the darkest, all terminating abruptly inward on the costa; numerous fawn-coloured freckles scattered on the disk: hind wing greyish brown at the base, dark fawn-colour exteriorly; veins indistinctly paler; an indistinct transverse pale discal line: abdominal margin blackish, with grey streaks; thorax and abdomen greyish brown, abdomen with very narrow indistinct whitish rings; antennæ and legs brown. Underside darker; apex of fore wing dark brown; hind wing freckled with numerous dark brown and white scales near anal angle; two short discal bands extending from abdominal margin.

Expanse $2\frac{1}{2}$ inches.

Hab. Java (*Wallace*). In Coll. W. W. Saunders.

Genus THEOPHILA, Moore.

THEOPHILA MANDARINA. (Plate XXXIII. fig. 5.)

Female grey: fore wing with a well-defined antemedian curved transverse brown band, and a transverse postmedian suffused brown line, beyond which is a submarginal white-bordered recurved narrow line, outside of which is a suffused brown patch below the apex; discocellular mark indistinct: hind wing brown, with a whitish submarginal line, and two white spots on abdominal margin: thorax brown; waist-band grey; antennæ fuliginous, shaft grey.

Expanse $1\frac{6}{8}$ inch.

Hab. Neighbourhood of Shanghai (*Mr. Pryer*). In Coll. F. Moore.

“Larva feeds on mulberry, and spins a white silk cocoon about three quarters of an inch long.”—*E. Holdsworth*.

Allied to *T. huttoni* from the North-west Himalayas; but the wings in this species are less scalloped, and it is a much smaller insect.

Subfam. NOTODONTINÆ.

Genus DUDUSA, Walk.

DUDUSA SPHINGIFORMIS. (Plate XXXIV. fig. 1.)

Male. Fore wing pale testaceous brown, with darker brown suffused streaks along the middle of the wing from base to near the apex; veins black; two irregular median transverse zigzag pale lines with more or less dark borders, terminating on the costa and hind margin in black streaks; exterior margin deeply scalloped and having three pale lunular lines, the median one being broad, the others narrow; the inner line with a contiguous black and a grey zigzag line crossing each other: hind wing dark fuliginous brown, with three narrow exterior marginal pale lunular lines to near the apex, a short zigzag pale line from anal angle, and an indistinct dark discal spot. Thorax pale testaceous brown, with dark brown lateral streaks. Abdomen fuliginous black, with some pale lateral streaks near the base and apex, and a large dense anal tuft of long spatulated hairs. Head, palpi, and antennæ fuliginous black.

Expanse $3\frac{1}{2}$ inches, length of body 2 inches.

Hab. Sikkim. In Coll. Capt. A. M. Lang and F. Moore.

Subfam. SATURNIINÆ.

Genus NEORIS, Moore.

NEORIS SHADULLA.

Male and female. Both wings with a broad median transverse grey band, palest on hind wing, the band bordered on each side by a black line, the inner or basal line being straight and extending from abdominal margin to the subcostal vein of the fore wing, and then indistinctly branching to base, the basal portion of the cell being white and the lower part of this wing streaked longitudinally with black; the outer line of band double, lunular on hind wing and zigzag on fore wing, terminating on the costa in a black spot, and bordered outwardly its entire length with white, the outer margin of the wings being fulvous brown and tinged at the apex of fore wing with red. Base of both wings with lax red hairs. Ocelli on both wings prominent, each encircled by a jet-black line which has a white streak along its inner half, middle of ocelli reddish brown outwardly and yellow inwardly, being divided by a narrow white-bordered talcose lunule. Underside as above, inner border of band almost obsolete. Ocellus of fore wing prominent, that of the hind wing composed only of a black narrow border to the talcose lunule. Body fulvous brown, thorax above with a white collar and black streak; segments of abdomen black-fringed. Antennæ fulvous brown.

Expanse, ♂ 4 inches, ♀ $3\frac{3}{4}$ inches.

Hab. Shadulla, near Yarkund, Eastern Turkestan. In Coll. F. Moore.

Note. The above species was collected by Mr. Shaw and Dr. PROC. ZOOLOG. SOC.—1872, No. XXXVII.

Henderson, who accompanied Mr. Forsyth during his late mission to Yarkund.

Genus CALIGULA, Moore.

CALIGULA CACHARA.

Male yellowish brown: fore and hind wings with two contiguous postmedian transverse lunular blackish lines, which on the fore wing are slightly zigzag before the costa and there terminate in a small elongated white-bordered black costal patch before the apex: fore wing with space from the base to the postmedian lines irrorated with minute black and grey scales, and an indistinct black-speckled submarginal line: hind wing with a well-defined whitish-yellow narrow lunular submarginal line. Ocelli of both wings large, rounded, with a grey central lunate mark; outer ring jet-black exteriorly, and bright pink interiorly, the latter bordered with an inner white line. A suffused brown transverse streak from costa to abdominal margin, passing through the ocelli exteriorly.

Expanse $3\frac{7}{8}$ inches.

Hab. N. Cachar (*Major Godwin-Austen*). In Coll. F. Moore.

Genus nov. RHODIA.

Wings ample, elongate, costa of fore wing in the male rounded, attenuated and falcated at the apex; hind wing rounded exteriorly. Body thick, short. Antennæ bipectinated to the tip. Ocelli hyaline, of a blunt oval shape.

Cocoon bag-shaped, compact, pendent from twigs.

RHODIA NEWARA.

Male and *female* dark yellow, both wings with a rather small discocellular hyaline spot of a blunt oval shape, having an inner white marginal line but no outer rings; a transverse subbasal reddish-black band, acutely angled on the hind wing; an undulated similar-coloured band traversing both wings transversely beyond the hyaline spot, being broadly bordered outward with ferruginous, and thickly irrorated with white scales, beyond which is a zigzag line dentated across and also between the veins, the space between which and the inner margin of the band on the hind wing is completely filled up with dark ferruginous brown, terminating on the costa of fore wing near the apex by a recurved black patch with a white-outer-bordered line; hyaline spots densely bordered with ferruginous brown scales; front of thorax, costa, and anterior portion of fore wing irrorated with ferruginous and white scales; exterior margin of both wings with a narrow pale fuliginous indistinct border.

Expanse 5 to $5\frac{1}{2}$ inches.

Hab. Kathmandoo, Nepal (*General Ramsay*). In Coll. F. Moore.

“Cocoon brilliant green, perfectly naked; pendent from twigs of weeping-willow. End of November and beginning of December.”

Subfam. LASIOCAMPIDÆ.

Genus APONA, Walk.

Apona, Walk. Cat. Lep. Het. B. M. vii. p. 1762 (1856).

Wings rather broad, costa convex towards the apex, which is slightly acuminate in the male and falcate in the female. Body thick, thorax covered with dense long hairs. Palpi very short, thickly clothed with long hairs. Antennæ long, half the length of costa, very broadly plumed to the tip in the male, pectinate in the female. Legs stout, densely clothed with long hairs; hind tibiæ with two moderately long thick apical spurs.

APONA PALLIDA.

Apona pallida, Walk. Cat. Lep. Het. B. M. vii. p. 1763 (1856), ♀.

Male and *female* brownish fawn-colour, with a pale chestnut-brown patch below the apex and extending along the exterior margin: fore wing with two transverse chestnut-brown narrow bands, which are oblique, and slightly recurved, but not undulated, the outer band bordered exteriorly with broad contiguous alternately long and short brown patches, the dividing veins on which are dark chestnut-brown in the male and paler in the female; between these are three parallel paler lunular bands; a dark brown discal dot within the cell: hind wing with similar transverse but less distinct bands. Underside as above, the transverse bands distinct. Thorax chestnut-brown. Antennæ of male with very broad bright chestnut plumes, the shaft being white.

Expanse 4 inches.

Hab. Sikkim. In Coll. British Museum and F. Moore.

APONA PLUMOSA, Moore.

Male greyish fawn-colour, exterior border of fore wing chestnut-brown: fore wing with transverse narrow bands beyond the cell; the exterior band straight, oblique, bright chestnut-brown, with whitish inner line; inner band blackish brown, zigzag; between the outer and inner bands are three indistinct parallel lunular bands; a black discal dot: hind wing with indistinct inner and outer transverse bands; exterior border of wing brown. Thorax and body chestnut-brown. Antennæ half the length of costa, with broad bright chestnut-brown plumes, shaft white. Underside uniform pale chestnut-brown; transverse bands indistinct.

Expanse $3\frac{2}{3}$ inches.

Hab. Kurnool, Nilghiris (*Dr. F. Day*). In Coll. F. Moore and W. W. Saunders.

Genus nov. ALOMPRA.

Male and *female*. Fore wings elongated, narrow; costa convex near the apex, which is acute; exterior margin very oblique, convex at the angle, hind margin one half the length of costa: hind wings short, trigonal; anterior margin very convex at the base, thence

straight to the apex, which is acute, and produced in the male, and extending beyond hind margin of fore wing; exterior margin convex; subcostal vein with six branches, the first branch starting from near the base at one half the length of the discoidal cell, thence proceeding to the costa near the apex; second starting from near end of the cell and sending forth a short or third branch near the apex; the fourth branch starts with the second; the fifth from one-third, and the sixth near the juncture, of the fourth, but outside the cell. Body robust, abdomen extending beyond hind wings. Legs short, densely clothed with hairs. Palpi short, densely pilose; third joint minute, imbedded in the hairs of second. Antennæ very small, short, curved backward, bipectinate in both sexes.

ALOMPRA FERRUGINEA. (Plate XXXIII. fig. 8.)

Male and *female* bright ferruginous: fore wing with a transverse curved row of black dots one fourth from the base, and a single dot at the base, and broad median and an exterior pale fuliginous-brown band, the former commencing from the costa near the base of the cell, and attenuating to middle of the hind margin outside the row of spots, and enclosing a red spot beyond the cell, the two bands partly divided posteriorly by a lunular red streak; the veins crossing the median band brown in the male, grey in the female, the portion crossing the exterior band being red: hind wing of male fuliginous between the veins along the exterior margin, this wing in the female being uniform ferruginous. Entire body and legs ferruginous. Shaft of antennæ jet-black, pectinations reddish yellow.

Expanse, ♂ $2\frac{3}{8}$, ♀ $3\frac{3}{8}$ inches.

Hab. Darjeeling (*A. Grote*). In Coll. F. Moore, W. W. Saunders, and Captain Lang.

GEOMETRES.

Genus ODONTOPTERA, Steph.

ODONTOPTERA CHALYBEATA. (Plate XXXIV. fig. 4.)

Allied to *O. discospilota*.

Dark dead green, washed with chalybeons, costal margin speckled with brown: both wings with a large rounded black discal spot, that on the hind wing the largest; two transverse submarginal brownish-green lunular lines with chalybeate-white borders. Thorax, vertex, and body green; front of head and palpi blackish. Exterior margin of both wings sharply dentate, and having a narrow brown marginal line; cilia buff-colour. Underside of wings and legs fawn-colour.

Expanse $1\frac{5}{8}$ inch.

Hab. N. India. Coll. W. W. Saunders.

Genus GEOMETRA, Linn.

GEOMETRA LINEATA. (Plate XXXIV. fig. 2.)

Male pale yellowish green: fore wing with a narrow brown-speckled yellowish costal band; two median transverse pale yellow

narrow lines from costa to hind margin, the outer line crossing the hind wing to near the anal angle: both wings with a brown dentate discal mark, the lower portion of which has a white centre: hind wing with a brown spot at the angle on middle of exterior margin. Cilia pale glossy fawn-colour. Head and body green. Antennæ and palpi brown.

Expanse $1\frac{3}{4}$ inch.

Hab. Sikkim. In Coll. W. W. Saunders and Captain Lang.

GEOMETRA ALBOVIRIDIS. (Plate XXXIV. fig. 3.)

Male dark green basally, white exteriorly: fore wing with a broad whitish brown-speckled costal band; exterior margin of both wings broadly white, the junction with the green being well defined by a recurved dividing line, outside which are some green and pale brown streaks; exterior margin defined by a narrow brown lunular line; some short transverse white strigæ on fore wing. Cilia white. Thorax and body green. Head yellow. Palpi and antennæ brown.

Expanse $1\frac{3}{4}$ inch.

Hab. N. India. In Coll. W. W. Saunders.

CRAMBICES.

Genus CHILO, Zeller.

CHILO CERVINELLUS. (Plate XXXIV. fig. 7.)

Fore wing brownish fawn-colour, paler between the markings; a longitudinal black streak extending from the base below the discoidal cell, and thrice interrupted by the veins, above which is another streak extending from within the cell to the exterior margin; a row of black dots on exterior margin: hind wing pale fawn-colour. Underside pale fawn-colour; markings of the upperside not visible. Palpi, head, and thorax whitish fawn-colour. Antennæ and abdomen brownish fawn-colour. Legs blackish.

Expanse $1\frac{3}{4}$ inch.

Hab. Nilghiris, S. India. In Coll. W. W. Saunders.

CHILO BIVITELLUS. (Plate XXXIV. fig. 8.)

Fore wing brownish white, with a black, indistinctly interrupted, longitudinal streak from base to exterior margin, a similar interrupted streak along posterior margin; exterior margin with a series of black dots: hind wing very pale fawn-colour. Underside paler, the upper band of fore wing only being indistinctly visible. Palpi, antennæ, body, and legs pale brown.

Expanse $1\frac{1}{4}$ inch.

Hab. Bombay (*Dr. Leith*). In Coll. F. Moore.

CHILO INTERRUPELLUS. (Plate XXXIV. fig. 5.)

Fore wing creamy white, slightly tinged with testaceous; a black longitudinal streak extending from base below the discoidal cell, and

thrice interrupted by the veins, above which is another streak from within the cell to the exterior margin, where there is a series of black dots: hind wing clear white. Underside paler, the streaks on the fore wing indistinctly visible. Palpi, head, body, antennæ, and legs creamy white. Anal tuft yellowish.

Expanse $1\frac{1}{2}$ inch.

Hab. Bombay (*Dr. Leith*). In Coll. F. Moore and W. W. Saunders.

CHILO INCONSPICUELLUS. (Plate XXXIV. fig. 6.)

Fore wing creamy white, with an indistinct fuliginous longitudinal streak from base below the cell, thrice interrupted by the veins, and a short streak above to near the exterior margin, where there is a series of fuliginous dots; hind wing fuliginous. Underside paler. Palpi, antennæ, and legs creamy white. Body fuliginous.

Expanse $1\frac{3}{8}$ inch.

Hab. Bombay. In Coll. W. W. Saunders.

Genus JARTHEZA, Walker.

JARTHEZA BIPLAGELLA. (Plate XXXIV. fig. 9.)

Fore wing yellowish brown; a prominent straight silvery-white longitudinal band extending from the base below the cell, a little beyond which it imperceptibly terminates; beneath and joining this band is a parallel jet-black streak of the same width, but tapered at each end; costa whitish, the extreme margin with a black border; a linear series of black scales within the cell, two small black spots on discocellular veins, beyond which are two longitudinal series of black scales; two transverse submarginal bands on exterior border, the first brown, the second silvery, the border beyond and the cilia white, the exterior border and the tip of the cilia being margined with a silvery line; between the extreme border and the inner silvery line is a transverse series of black dots: hind wing silky white, with a very slight brownish shade from the anal angle along exterior margin. Head, thorax, and body white; tegulæ black. Antennæ and legs brownish white.

Expanse $1\frac{2}{2}$ inch.

Hab. Bombay. In Coll. W. W. Saunders.

DESCRIPTION OF THE PLATES.

PLATE XXXII.

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PLATE XXXIII.

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| Fig. 1. <i>Calpenia saundersi</i> , p. 571. | Fig. 5. <i>Theophila mandarina</i> , p. 576. |
| 2. <i>Neochera tortuosa</i> , p. 570. | 6. <i>Norasuma javanica</i> , p. 576. |
| 3. <i>Agrisius fuliginosus</i> , p. 571. | 7. <i>Hypercompa regalis</i> , p. 575. |
| 4. <i>Bizone gazella</i> , p. 572. | 8. <i>Atompra ferruginea</i> , p. 580. |

PLATE XXXIV.

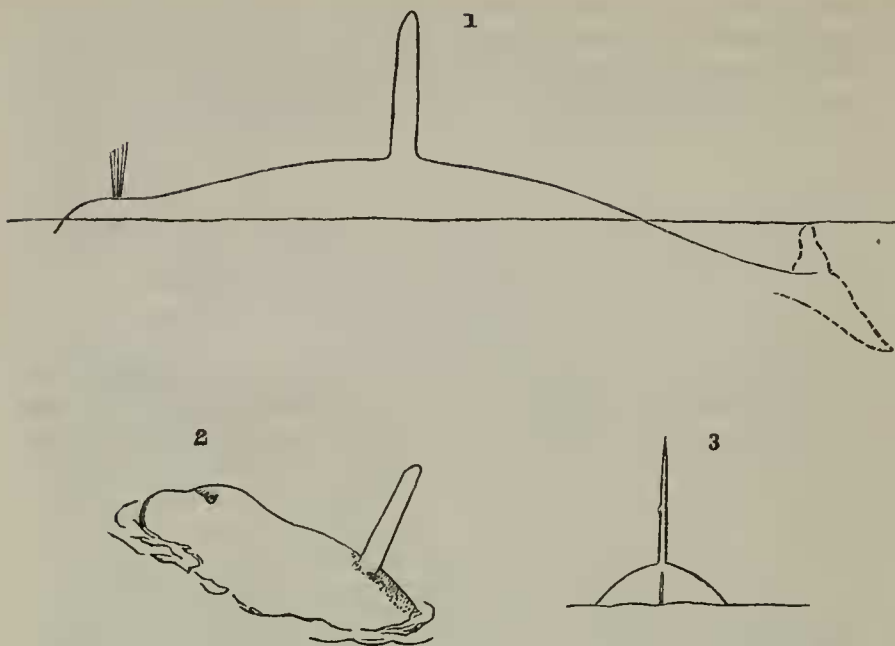
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| 4. <i>Odontoptera chalybeata</i> , p. 580. | 9. <i>Jartheza biplagella</i> , p. 582. |
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6. Note on a Cetacean observed on the West Coast of Ceylon.

By E. W. H. HOLDSWORTH, F.L.S., F.Z.S.

[Received April 9, 1872.]

Whilst becalmed a few miles off Chilaw, on the west coast of Ceylon, on the 7th of April, 1868, my attention was attracted by hearing, not far from the vessel, the blowing sound usually produced by Cetaceans when they have come to the surface to breathe. I found that the noise proceeded from a small Whale, which was lying motionless, with its back exposed, not more than fifty yards from the vessel. The first flaws of the sea-breeze had not yet appeared on the water, and the surface was undisturbed by even a ripple. It was a favourable time for observation; and as I had a good binocular glass and my note-book by my side, I was at once able to observe distinctly and to sketch that portion of the body of the animal which was seen above water. From first to last, it was more or less visible for four minutes; and during that interval it blew five times. The whole animal was not seen; but from such parts of it as rose at different times above the surface it appeared to be about twenty-five feet long, with a rounded back and a rather thick body. Its most remarkable feature, and the one to which I wish especially to direct attention, was the dorsal fin (fig. 1, p. 584), which could not have been less than five feet high, standing erect on the highest part of the back and shaped like the pointed extremity of an ordinary sword, with the anterior edge slightly convex and the posterior straight. After breathing, the animal very slowly sank in a horizontal position till only half the dorsal fin was left exposed; and so it remained for about thirty seconds, when it again came to the surface and blew as before; this was repeated four times after its first appearance, before the animal finally went down. The profile of the head was not entirely seen, so that the shape of the nose, whether beaked or otherwise, could not be ascertained; but the top of the forehead, when looked down upon from behind as the animal rose head first on one occasion in an altered position, presented a broad rounded outline (fig. 2), with an indentation in the centre leading to a distinct longitudinal depression on the top of the head, in which the blow-hole was placed. The alteration in the position of the animal from broadside to nearly end-on enabled me to see also that the dorsal fin had the thin flattened shape (fig. 3) usual in that appendage. After the fifth breathing the head sank down, the broad transverse flukes showed for a moment at the surface, and the animal finally disappeared. Its behaviour was evidently that of a true Whale, and totally unlike that of Dolphins and other small Cetaceans, which



only show above water at short intervals for one or two seconds at a time and do not check their headlong career when they come to the surface to breathe.

Some of the crew of my vessel who were looking at this Whale told me they had seen the same animal before; and although there is not much reliance to be placed generally on what the natives say when they see you are interested in the subject, inasmuch as they usually endeavour to tell you exactly what they think will be most agreeable, it may be worth while to note the few particulars I gathered from them.

They called it the "Palmyra fish," but did not seem to know why that name had been given. I may mention that most of the crew I had in this vessel were Malabar men and natives of a coast where the tall palmyra is almost the only tree to be seen; and it may be that the high erect fin of this species of Whale had before now recalled the appearance of this tree and suggested the name of "Palmyra fish," by which the animal appeared to be known. They said it was most frequently seen to the west of Cape Comorin, and that from its habit of remaining for a time at the surface it sometimes came in the way of vessels working along that coast. They also said these Whales were very pugnacious, fighting furiously at times among themselves, and "running against each other like sheep." They were consequently avoided as much as possible by the native craft.

The colour of those parts of this Whale which were visible above water (namely, the top of the head, back, dorsal fin, and tail) was greyish black; but I was unable to ascertain either the colour or shape of the underparts. What I saw of the animal gave me the idea of its being of comparatively short and thick proportions; but

the shape of the dorsal fin, the manner in which it was set on the back, the form of the top of the head, and the approximate position of the blow-hole are characters of which I can speak with confidence, and which I believe are represented with a close approach to accuracy in the accompanying outlines, reduced from the sketches I made from the animal itself. The place where I fell in with this Whale was about seven miles from the land, in the deep water of the Gulf of Mannar, just beyond the bank of soundings which runs along the coast of Ceylon; and although I spent many weeks every year in cruising on that coast whilst engaged in pearl-fishery work, and saw numbers of the smaller Cetaceans, I never met with an animal of this description except on the occasion I have mentioned.

This Cetacean was more or less visible for quite four minutes (three minutes and a half from the time of its partial submersion after its first breathing), and under favourable circumstances for observations; but the particulars I have been able to give are of course insufficient to enable me to say to what special group of Whales this one may belong. It would be easier to point out, if necessary, those from which its observed characters and manners would seem to exclude it; but there would still remain so many groups in which our ignorance of external characters might permit it to be included that no definite conclusion could be arrived at from a consideration of its possible affinities. The only recognized Cetaceans having a dorsal fin at all resembling in size and form that I have described are:—(1) The one to which Steenstrup has given the name *Orca eschrichtii*, from the Færoe Islands; of this the copy of a rough sketch is given by Eschricht in his paper “On the Northern Species of *Orca*,” which forms part of the ‘Recent Memoirs on the Cetacea’ published by the Ray Society, 1866, p. 187, and edited by Professor Flower. In this case, however, the dorsal fin, although fully five feet high in an animal apparently about twenty-two feet long, is rather different in form from the one I have been speaking of; it tapers from the base upwards, and is directed somewhat backwards instead of being vertical. (2) *Orca rectipinna*, Cope*, ranging “from California southwards.” The fin in this species stands quite erect, and is six feet high in an animal twenty-five feet long, but tapers regularly from a breadth of about eighteen inches at the base to its pointed apex, in this respect differing materially from the narrow sword-like form of the one under notice. The species of *Orca* and of the allied genus *Grampus* are very predaceous animals; they are active and dashing in their movements, as I have had many opportunities of observing in the case of the *Grampus* on the English coast; in this habit they resemble the Dolphins, as well as in not stopping when they come to the surface to breathe. This is entirely different from the generally sluggish and true whale-like manners of the animal I observed in the Gulf of Mannar. Professor Owen has within the last few years described in our ‘Transactions’ (vol. vi. pt. 1, 1866) no less than

* “On the Cetaceans of the Western Coast of North America,” by C. M. Seammon, edited by E. D. Cope, Proc. Acad. Nat. Sci. Phil. vol. xxi. p. 22 (1869).

seven species of small Indian Cetacea, one of them being remarkable for its affinity to the Sperm-Whale (*Physeter*); and there is no reason to suppose we have not still a good deal to learn about the Cetacea of that region. It is not improbable, therefore, that the so-called "Palmyra fish" may belong to a section hitherto unnoticed; and I have now brought the subject before the Society in the hope that these notes may fall into the hands of persons having opportunities of making further observations on the animal, and of obtaining information on the many points about which unfortunately I can say nothing.

It may be worth while recording here a circumstance in connexion with the Cetacea, which came under my notice one day whilst I was at anchor on the Pearl Banks. Besides the well-known Dugong (*Halicore*), which the late Sir J. Emerson Tennent has figured (*Nat. Hist. of Ceylon*, p. 69, 1861) sitting up in the water like a supposed mermaid (a position never observed by myself or any one I have been able to meet with), three easily distinguished forms of Dolphin or Porpoise frequented the north-west coast of Ceylon—one of them, remarkable for its long slender snout, being probably *Delphinus longirostris*. A herd of about two hundred of this species, the largest number I ever saw together, was one day observed slowly advancing in a closely packed line towards the vessel. They were making a great commotion and apparently driving a shoal of small fish; but whilst thus engaged, I distinctly observed, at least four or five times, a pair of these animals assume a vertical position, with their heads well above the surface, for three or four seconds. This attitude is so precisely what has been described by several persons who have had good opportunities of observing Cetaceans as the one assumed whilst *in copulâ*, that I have no doubt what I then saw will bear the same explanation. The performance was repeated in different parts of the line, but only at one place at a time, as if there were one eager male paying his attentions successively to different individuals of the opposite sex. This is what might be expected among gregarious animals; but the frequency with which I have observed a single pair of Porpoises in our own harbours leads me to doubt whether even the generally gregarious species of Cetacea are in all cases unrestricted in their loves, and to believe that pairing, at all events during part of the year, may be the rule with some of them.

7. On the Reptiles and Amphibians of Borneo.

By ALBERT GÜNTHER, M.A., M.D., Ph.D., F.R.S., F.Z.S.

[Received March 21, 1872.]

(Plates XXXV.—XL.)

In order to determine the specimens of a considerable collection of Reptiles and Amphibians, made by Mr. Everett at Matang in the district of Sarawak, and recently purchased by the Trustees of the



A

B



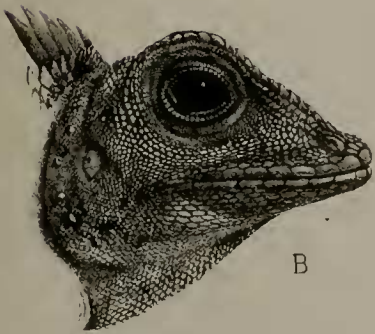
G.H.Ford

Mintern Bros imp

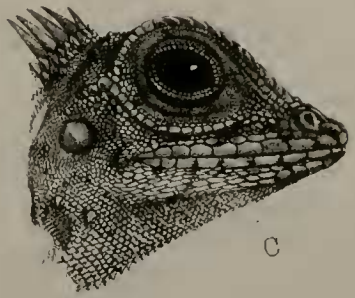
TIARIS LIOGASTER.



A



B



C

G.H.Ford.

Mintern Bros imp.

A LOPHOCALOTES INTERRUPTUS.
B. TIARIS MIOTYMPANUM C. TIARIS SOPHIÆ.



